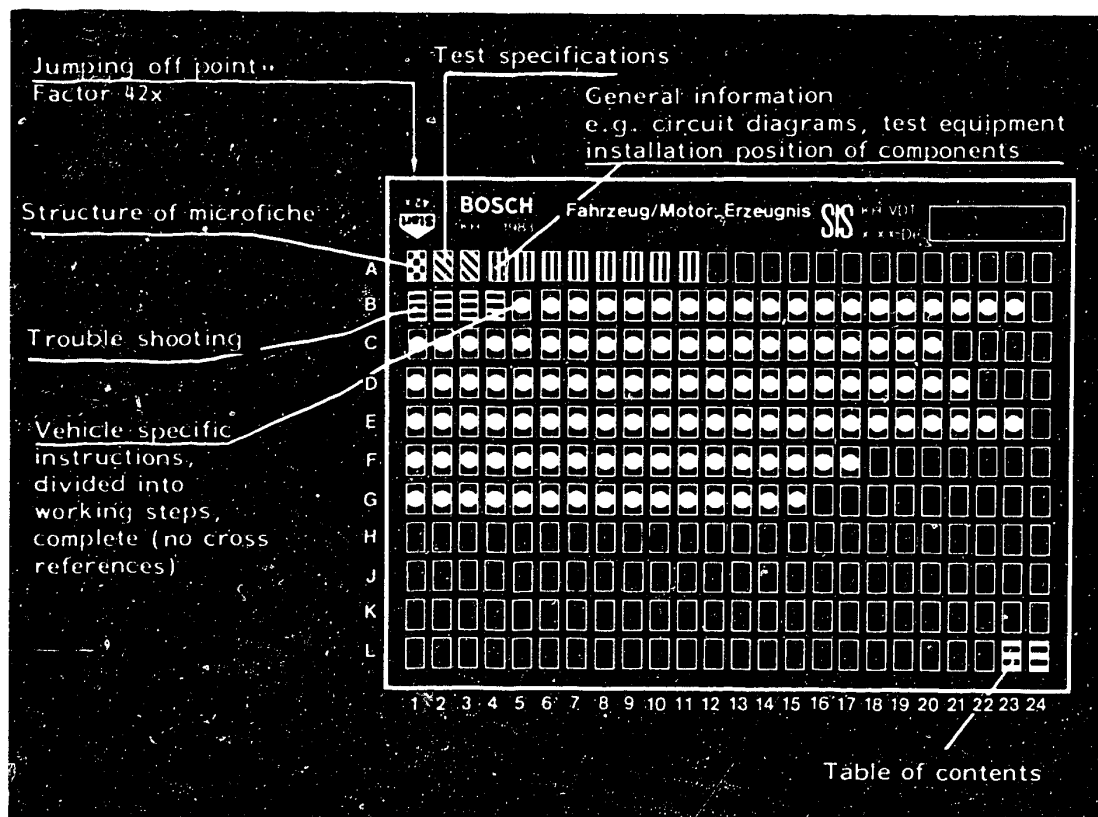


# Microfiche layout



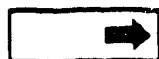
1. Read from left to right

2. Title of microfiche (appears on each coordinate)

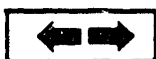
|             |                            |  |
|-------------|----------------------------|--|
| <b>E 16</b> | Product/assembly/test step |  |
|             | Vehicle/engine             |  |

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

**C 6**

**A 1**

Trouble-Shooting Plan



## 1. Test specifications

**C9**

### 1.1 Idle speed:

1.1.1 R 18 D, R 20 D

 $725 \pm 25 \text{ min}^{-1}$ 1.1.2 R 20 TD, R 30 TD,  
Fuego TD $675 \pm 25 \text{ min}^{-1}$ **C15**

### 1.2 Nozzle-opening pressure

 $130 + 8 \text{ bar}$ **C20**

### 1.3 Filter test

max. permissible differential  
pressure:

0.3 bar

**E2**

### 1.4 Compression loss:

max. 25 %

**G4**

### 1.5 Injection timing

Engine position:

cylinder 1 at  
TDCChecking value

Pump position:

0.69...0.71 mm  
ABDCSetting value

Pump position:

0.70 mm ABDC

### 1.6 Compression pressure:

20 ... 30 bar

### 1.7 Charge-air pressure:

 $0.6 \text{ bar} \pm 0.025$ **A2**Test specifications

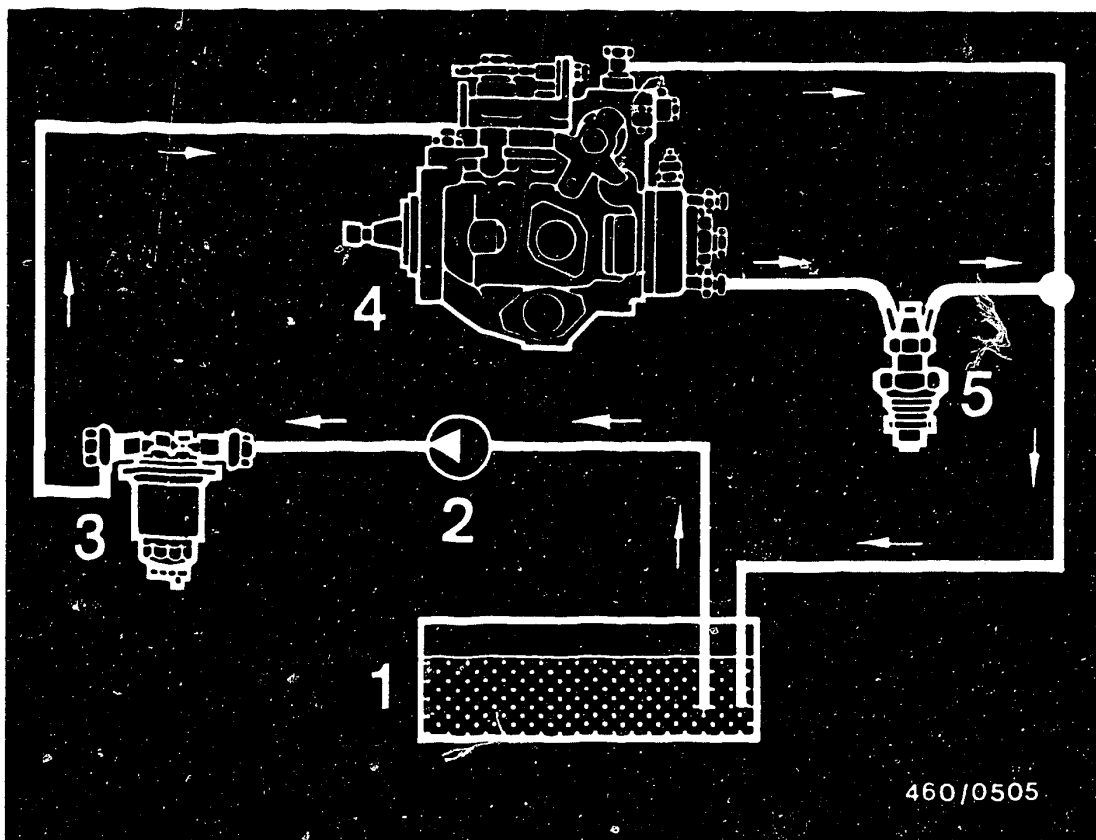
Renault 18/20 D, 20/30 TD, Fuego TD



## 1.8 Tightening torques

|                                                      |       |
|------------------------------------------------------|-------|
| Fuel-injection pump fastening screws                 | 25 Nm |
| Injection-pump gear<br>(hexagon nut)                 | 50 Nm |
| Nozzle-holder assembly                               | 17 Nm |
| Fuel lines                                           | 25 Nm |
| Screw plug                                           | 10 Nm |
| Injection-pump support bracket<br>(fastening screws) | 25 Nm |
| Sheathed-element glow plugs                          | 40 Nm |





- 1 = Fuel tank
- 2 = Fuel pre-supply pump (on export models only)
- 3 = Fuel filter
- 4 = Distributor-type fuel-injection pump
- 5 = Injection nozzles

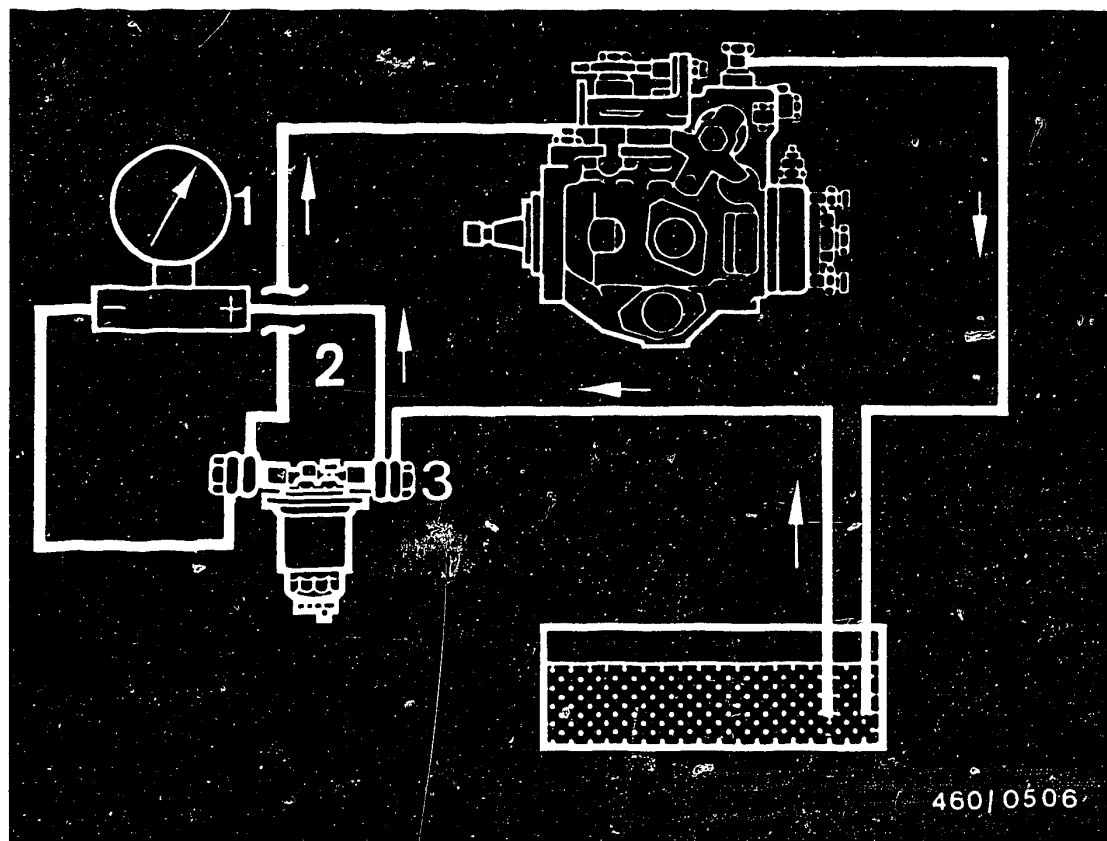
## 2. Connection diagram of fuel lines

The fuel lines are connected according to the above diagram.

The fuel flows in the direction of the arrows.





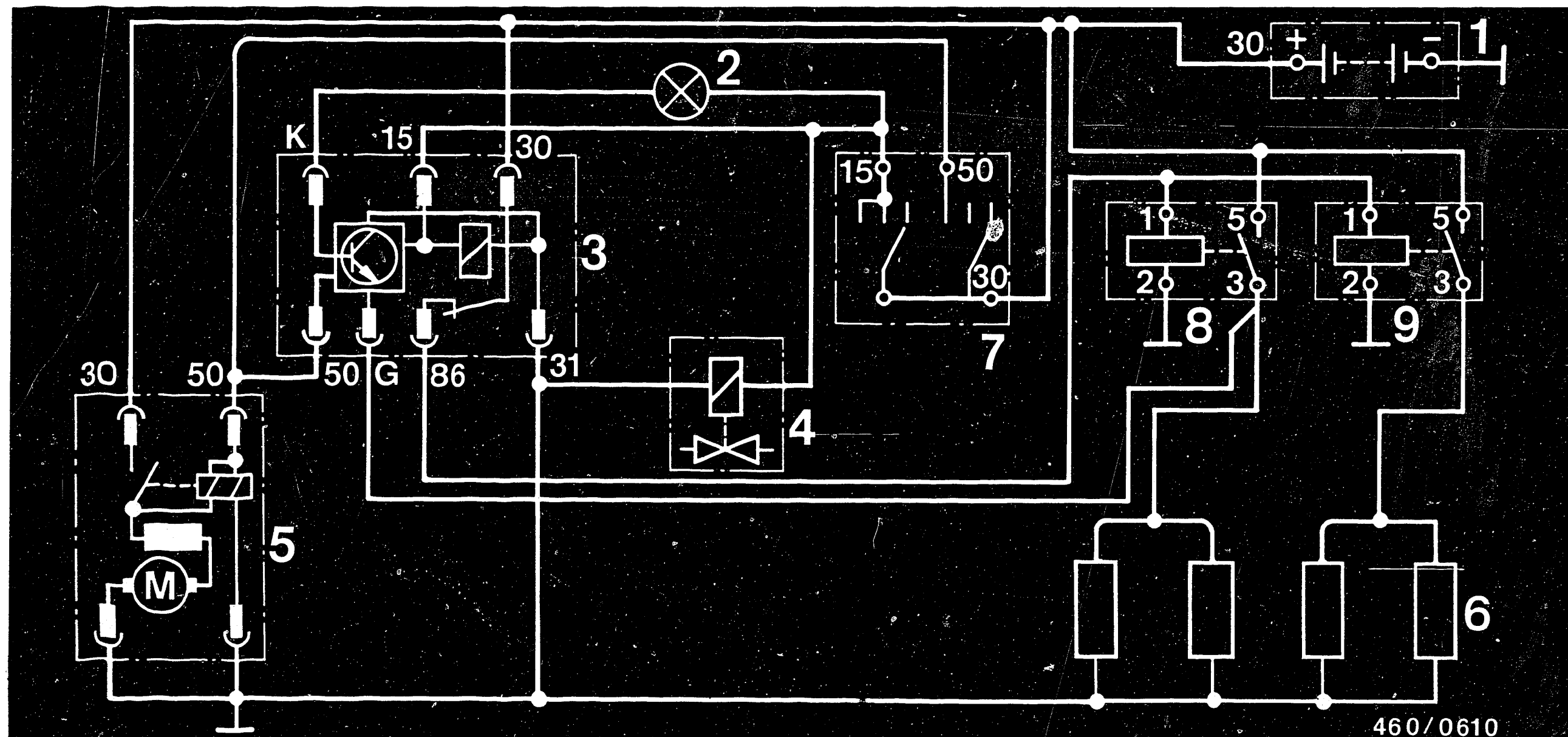


- 1 = Differential-pressure gauge
- 2 = Filter outlet (use inlet union and extra-long inlet-union screw 2 443 456 020)
- 3 = Filter inlet (use inlet union and extra-long inlet-union screw 2 443 456 020)

#### 2.1 Connection diagram for filter test

Connect differential-pressure gauge to fuel filter using appropriate connecting pieces.





460/0610

- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor

- 6 = Sheathed-element glow plugs
- 7 = Glow-plug and starter switch
- 8 = Power relay
- 9 = Power relay

3. Terminal diagram of pre-heating system in Renault 18D, 20D, 20TD, 30TD, Fuego TD

#### 4. Test equipment and tools

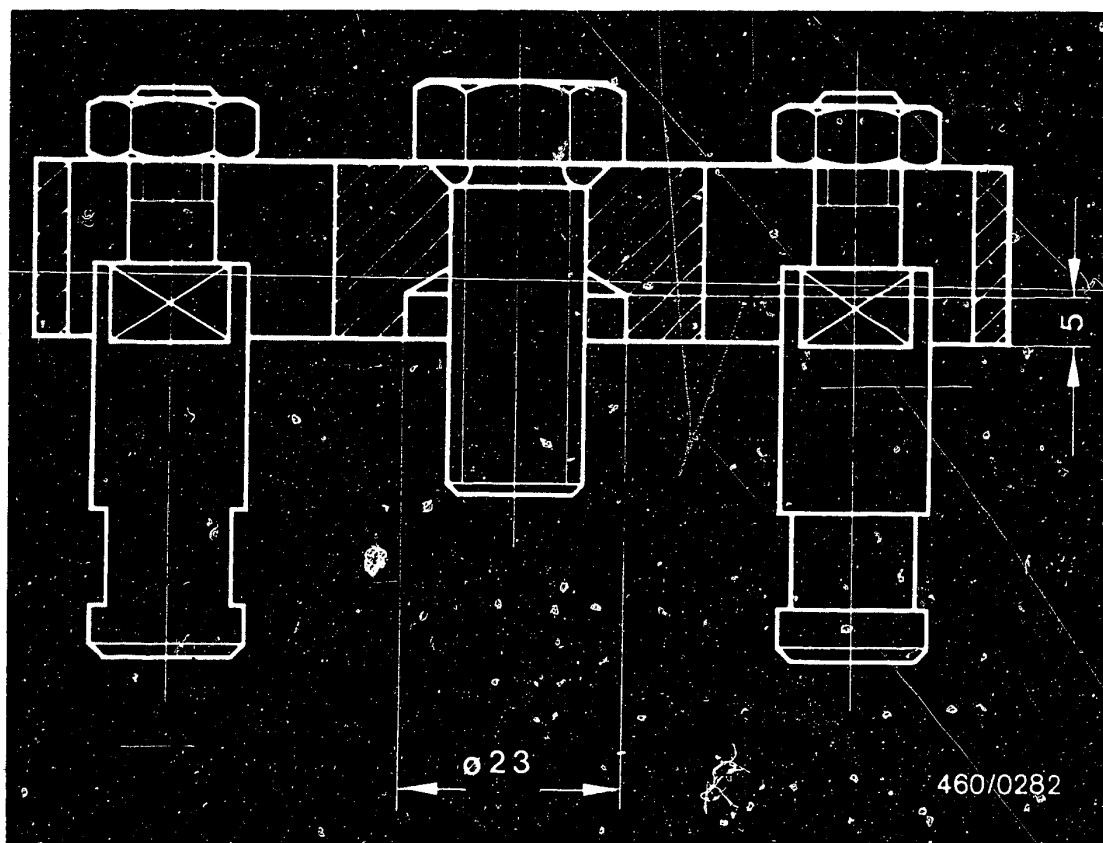
| Description                                        | Part Number                                                                                                        | Use                                  |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Puller                                             | KDEP 1118*                                                                                                         | Removing injection-pump gear         |
| Setting mandrel                                    | KDEP 1123                                                                                                          | Locking crankshaft                   |
| Holding device                                     | KDEP 1124                                                                                                          | For locking the pump drive gear      |
| Toothed-belt tester                                | KDEP 1121                                                                                                          | Testing tension of toothed belt      |
| Box wrench                                         | KDEP 1115                                                                                                          | Loosening/tightening injection lines |
| Pressure tester or pressure gauge<br>0 ... 1.6 bar | KDJE-P 100<br>e.g.<br>Wika<br>No. 4184                                                                             | Testing charge-air pressure          |
| Measuring tool                                     | KDEP 1085                                                                                                          | Injection timing                     |
| Mini dial indicator<br>1 / 100 mm divisions        | Commercially available<br>e.g.<br>Hahn & Kolb<br>7000 Stuttgart<br>Part No.<br>33 003<br>with adapter<br>KDEP 1127 | Injection timing                     |
| Connection nipple                                  | 6 220 103 225<br>Moto-Meter                                                                                        | Testing compression pressure         |



## Test equipment and tools (continued)

| Designation                 | Part No.                                                                                                                               | Use                                 |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Nozzle tester               | EFEP 60 H<br>0 681 200 502                                                                                                             | Testing the injection nozzles       |
| Compression tester          | Commercially available                                                                                                                 | Testing the engine compression      |
| Compression-loss tester     | EFAW 210 A<br>0 681 001 901                                                                                                            | Testing the engine compression loss |
| Tachometer                  | Commercially available                                                                                                                 | Setting the engine speed            |
| Differential-pressure guage | Commercially available<br>Part No.<br>NG 160/311-911/<br>- 1.0 + 4.0 bar<br>Firma Henni<br>Nauheimerstr.<br>78-80<br>7000 Stuttgart 50 | Filter test                         |
| Smoke tester                | 0 681 169 039<br>0 681 169 038                                                                                                         | Smoke test                          |





\* Modification to existing special tools

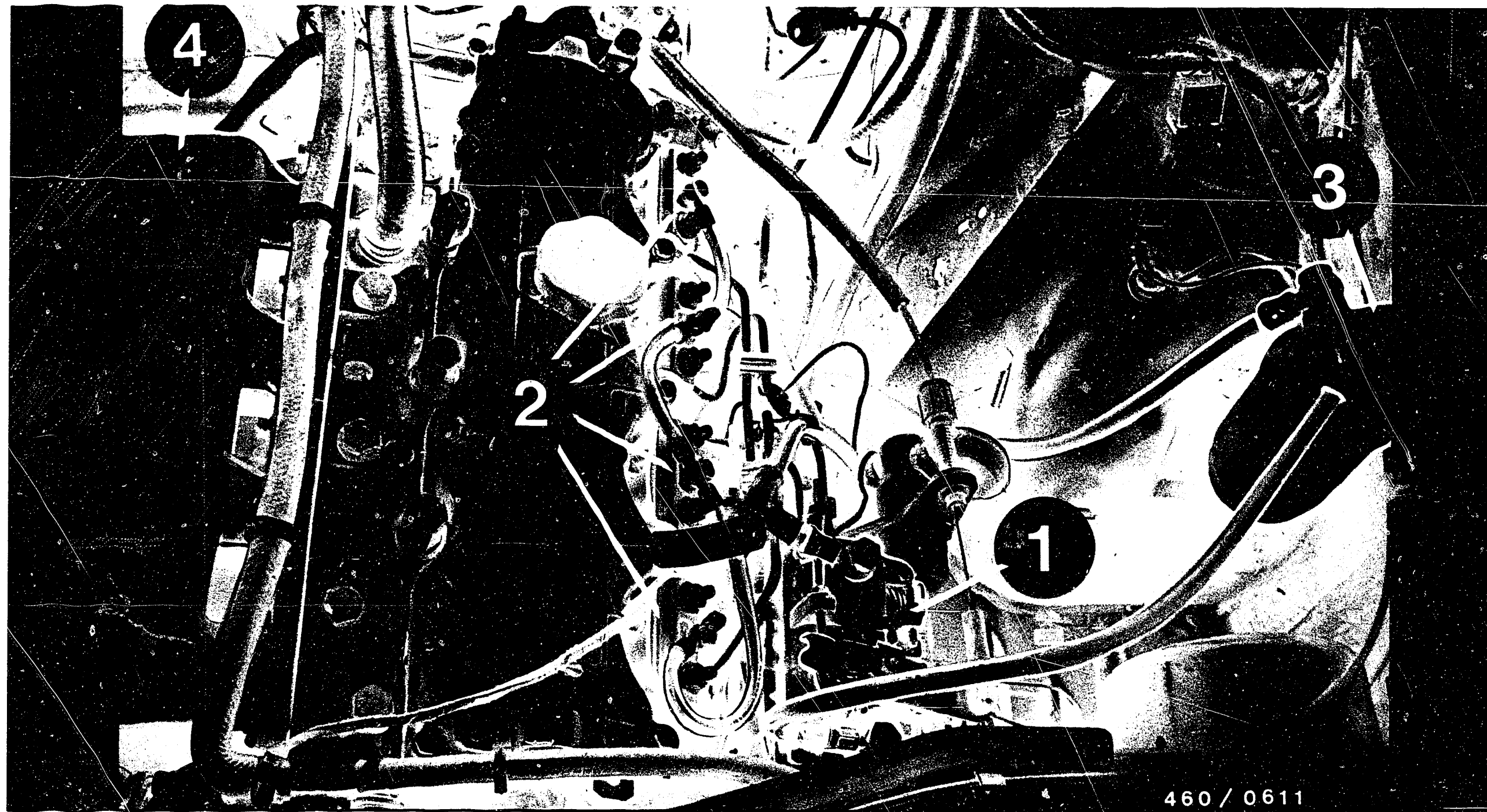
Existing pullers KDEP 1118 must be modified in accordance with the above sketch.

**A10**

Test equipment and tools

Renault 18/20 D, 20/30 TD, Fuego TD





460 / 0611

1 = Fuel injection pump

2 = Injection nozzles

3 = Fuel filter

4 = Air filter

5. Installation position of components on Renault 18 D (8.80 → ) and Renault 20 D (12.79 → )

**A11**

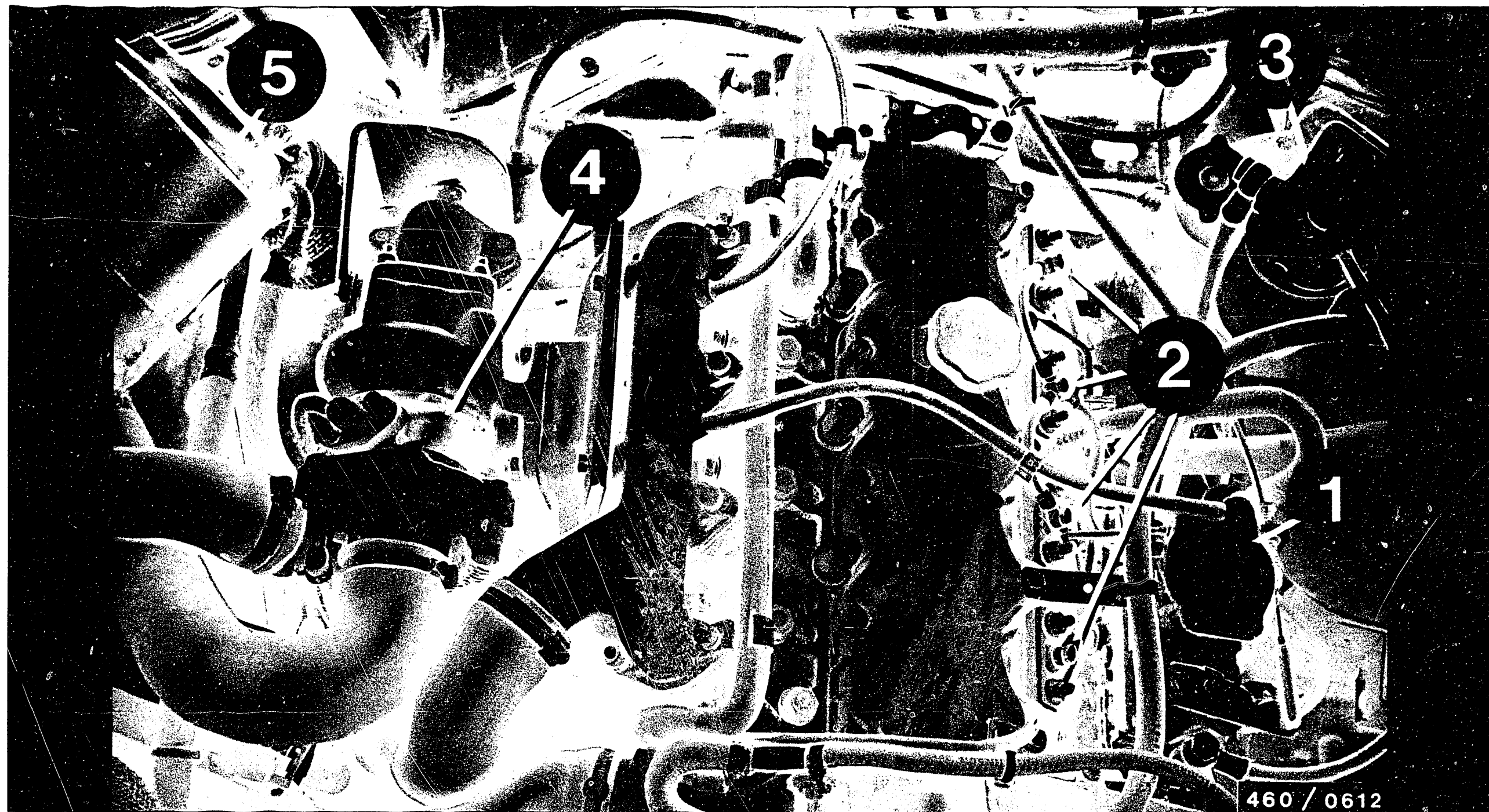
Installation position of components  
Renault 18/20 D, 20/30 TD, Fuego TD



**A12**

Installation position of components  
Renault 18/20 D, 20/30 TD, Fuego TD





1 = Fuel-Injection pump    2 = Injection nozzles    3 = Fuel filter    4 = Turbocharger    5 = Air filter

Installation position of components (continued)

Renault 20 Turbo-Diesel (9.82 → ), Renault 30 Turbo-Diesel (9.81 → ) and Fuego Turbo-Diesel (9.82 → )

**A13**

Installation position of components  
Renault 18/20 D, 20/30 TD, Fuego TD



**A14**

Installation position of components  
Renault 18/20 D, 20/30 TD, Fuego TD



## 6. Trouble-shooting - Customer complaint (symptom)

1. Engine fails to start or starts only with great difficulty when warm.
2. Engine fails to start or starts only with great difficulty when cold.
3. Engine hunts when idling.
4. Erratic idling when engine is warm.
5. Engine misses during vehicle operation.
6. Unsatisfactory performance.

|   |   |   |   |   |   | Cause (component fault)                                       | Coordinate |
|---|---|---|---|---|---|---------------------------------------------------------------|------------|
| • | • |   |   | • | • | Tank empty; tank vent clogged                                 | B 5        |
|   | • |   |   |   |   | Cold-start accelerator not actuated                           | B 6        |
|   | • |   | • |   |   | Injection sequence does not correspond to firing sequence     | B 7        |
|   |   |   |   | • |   | Overflow restriction clogged                                  | B 8        |
| • | • |   |   |   |   | Shutoff device defective                                      | B 9        |
|   |   | • |   | • | • | Inlet-union screws of inlet and return lines clogged          | B 13       |
| • | • |   | • | • | • | Air in fuel system                                            | B 15       |
|   | • |   |   |   |   | Heavy paraffin deposits in filter                             | B 18       |
| • | • |   |   | • | • | Connections loose; lines leaky or broken                      | B 21       |
| • | • |   |   | • | • | Supply lines clogged                                          | B 23       |
| • | • |   |   | • | • | Fuel-injection tubing clogged or constricted                  | B 23       |
|   |   |   |   |   | • | Engine air filter clogged                                     | C 8        |
|   |   |   | • |   |   | Idle speed incorrect                                          | C 9        |
| • | • |   | • |   | • | Injection nozzle defective                                    | C 15       |
|   | • |   | • |   | • | Start of pump delivery incorrect                              | G 4        |
| • | • |   |   | • | • | Fuel filter clogged                                           | C 20       |
|   | • |   |   |   |   | Pre-heating system defective                                  | D 1        |
|   |   |   |   |   | • | Timing device defective                                       | D 20       |
|   | • |   | • |   |   | Engine compression poor or uneven                             | D 21       |
|   |   |   |   |   | • | Maximum speed incorrectly adjusted                            | E 8        |
| • | • | • | • | • | • | Fuel-injection pump (governor) defective or out of adjustment | E 8        |
|   |   |   |   |   | • | Test turbocharger for leaks and test charge-air pressure      | G 10       |

# B1

## Trouble-shooting chart

Renault 18/20 D, 20/30 TD, Fuego TD



## B2

### Trouble-shooting chart

Renault 18/20 D, 20/30 TD, Fuego TD





# Trouble-shooting (continued) - Customer complaint (symptom)

|                                                                               |   |   |   |   |   |                                                                 |            |
|-------------------------------------------------------------------------------|---|---|---|---|---|-----------------------------------------------------------------|------------|
| 7. Excessive fuel consumption.                                                |   |   |   |   |   |                                                                 |            |
| 8. Engine cannot be switched off.                                             |   |   |   |   |   |                                                                 |            |
| 9. Engine runs rough, black smoke in full-load range; possibly lack of power. |   |   |   |   |   |                                                                 |            |
| 10. Fog-like smoke in full-load range (white).                                |   |   |   |   |   |                                                                 |            |
| 11. Incorrect engine speeds.                                                  |   |   |   |   |   |                                                                 |            |
| 12. Engine will not rev up when cold.                                         |   |   |   |   |   |                                                                 |            |
| 13. Distributor-type fuel-injection pump becomes too hot.                     |   |   |   |   |   |                                                                 |            |
| Cause (component fault)                                                       |   |   |   |   |   |                                                                 | Coordinate |
|                                                                               |   |   | • |   | • | Tank empty; tank vent clogged                                   | B 5        |
|                                                                               |   |   |   |   | • | Cold-start accelerator not actuated                             | B 6        |
|                                                                               |   | • |   | • | • | Injection sequence does not correspond to firing sequence       | B 7        |
|                                                                               |   |   |   |   | • | Overflow restriction clogged                                    | B 8        |
|                                                                               | • |   |   |   |   | Shutoff device defective                                        | B 9        |
|                                                                               |   |   | • | • | • | Inlet-union screws of inlet and return lines clogged            | B 13       |
|                                                                               |   |   | • |   | • | Air in fuel system                                              | B 15       |
|                                                                               |   |   |   |   | • | Heavy paraffin deposits in filter                               | B 18       |
| •                                                                             |   |   |   |   |   | Connections loose; lines leaky or broken                        | B 21       |
|                                                                               |   |   | • |   | • | Supply lines clogged                                            | B 23       |
|                                                                               |   |   | • |   | • | Fuel-injection tubing clogged or constricted                    | B 23       |
|                                                                               |   | • |   |   |   | Engine air filter clogged                                       | C 8        |
|                                                                               |   |   |   | • |   | Idle speed incorrect                                            | C 9        |
|                                                                               |   | • |   |   |   | Injection nozzle defective                                      | C 15       |
| •                                                                             |   | • | • |   | • | Start of pump delivery incorrect                                | G 4        |
|                                                                               |   |   | • |   | • | Fuel filter clogged                                             | C 20       |
|                                                                               |   | • | • |   |   | Timing device defective                                         | D 20       |
| •                                                                             |   |   |   |   | • | Engine compression poor or uneven                               | D 21       |
|                                                                               |   |   |   | • |   | Maximum speed incorrectly adjusted                              | E 8        |
| •                                                                             | • | • | • | • | • | • Fuel-injection pump (governor) defective or out of adjustment | E 8        |

**B3**

Trouble-shooting chart

Renault 18/20 D, 20/30 TD, Fuego TD

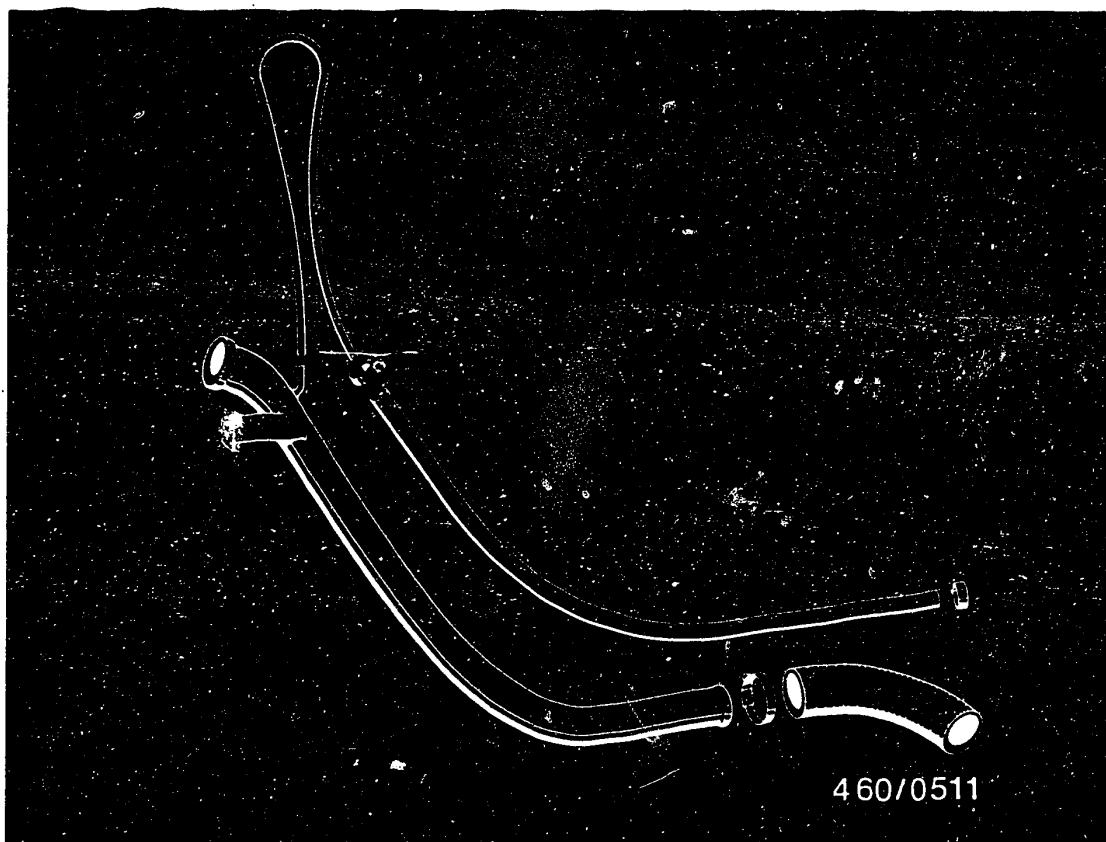


**B4**

Trouble-shooting chart

Renault 18/20 D, 20/30 TD, Fuego TD





### 7. Check tank vent

Open tank filler cap.

If the fault disappears after opening the filler cap, the tank vent is defective.

Remove tank-vent hose lines (picture) and check for clogging or constriction.

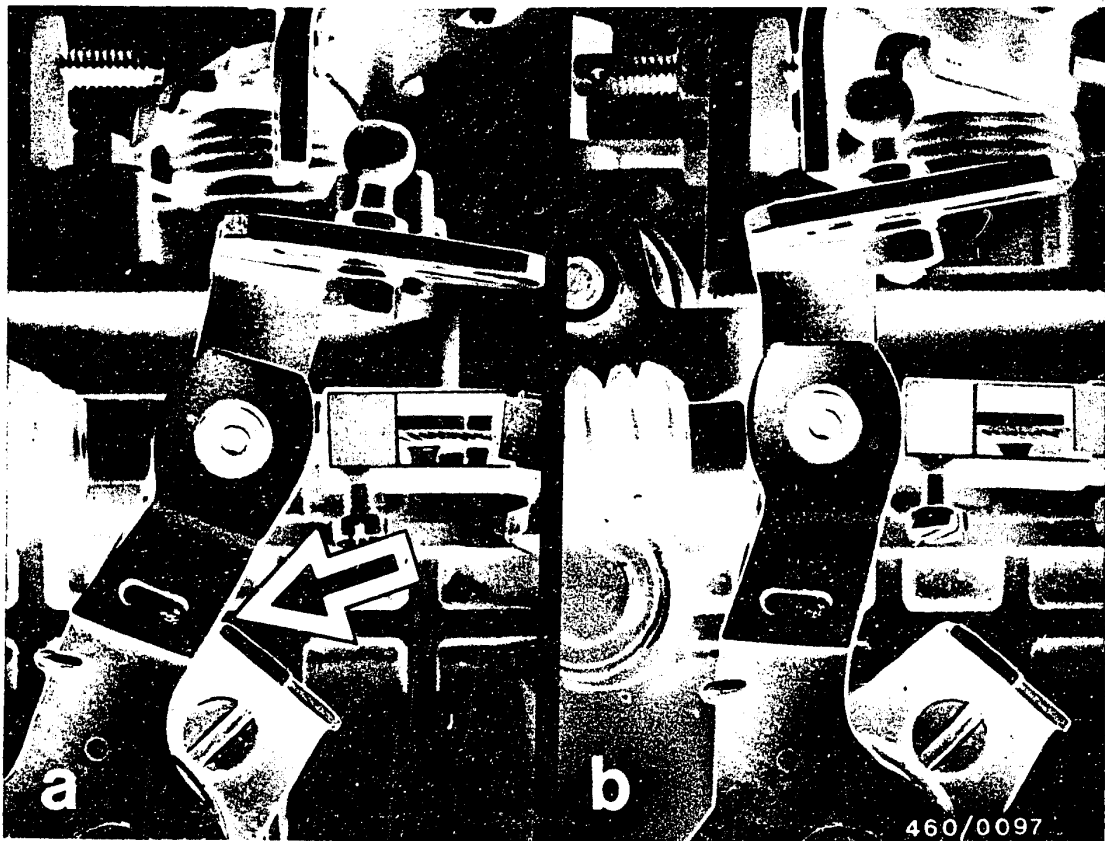
If necessary, check fitting on tank.

**B5**

Check tank vent

Renault 18/20 D, 20/30 TD, Fuego TD





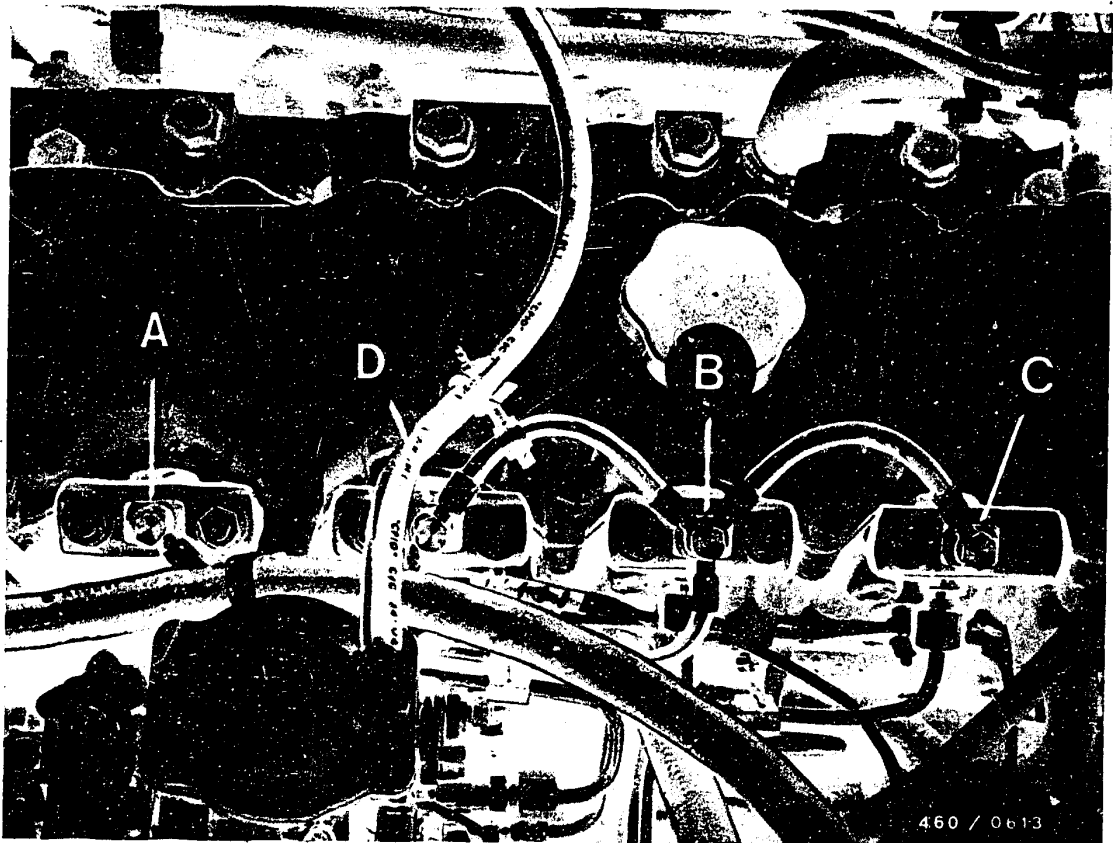
#### 8. Test operation of temperature-controlled cold-start accelerator

If the cold-start accelerator is correctly set, with the engine at normal operating temperature (coolant temperature approx. 80°C) the control lever of the cold-start accelerator must be up against the stop bracket (picture a - arrow).

When the engine is cold, the control lever of the cold-start accelerator has reached its maximum working stroke (picture b).

If, when cold, the control lever remains up against the stop bracket or makes only a short stroke, it is necessary to remove and reset the injection pump.





### 9. Check routing of fuel-injection tubing

The individual fuel-injection lines are held together by clamps so that it is impossible for the outlets to be mixed up.

If, however, there is any doubt, check the routing of the lines as shown in the picture above.

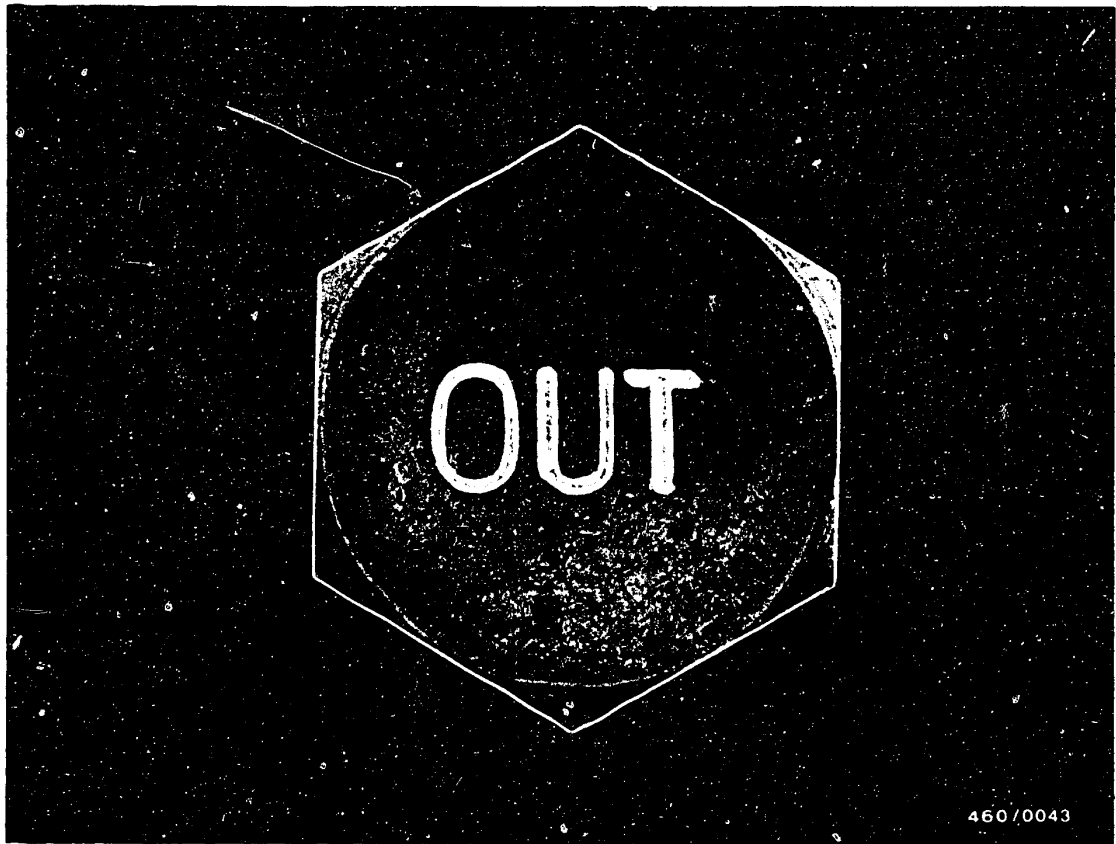
The pairing of the fuel-injection pump outlets with the individual engine cylinders is identified by the letters A ... D.

**B7**

Check routing of fuel-injection tubing

Renault 18/20 D, 20/30 TD, Fuego TD





10. Test overflow restriction

Unscrew overflow restriction on fuel-injection pump (marked "out").

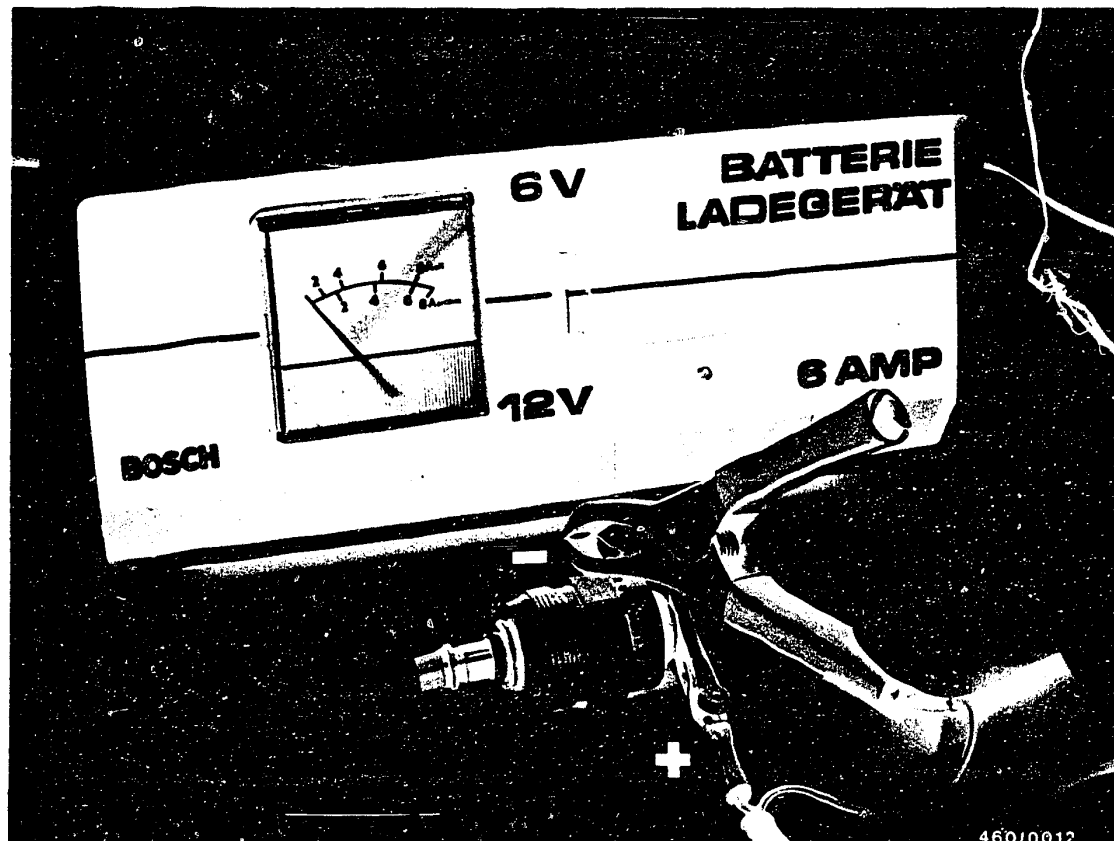
Perform visual inspection of wire screen for impurities. If in doubt, replace overflow restriction.

**B8**

Check overflow restriction

Renault 18/20 D, 20/30 TD, Fuego TD





## 11. Check operation of shutoff device

### 11.1 Engine fails to start

Check whether solenoid-operated valve is supplied with voltage (min. 10 V) with glow-plug and starter switch switched on (drive position).

If voltage is present, remove fuel-injection tubing and take out solenoid-operated valve.

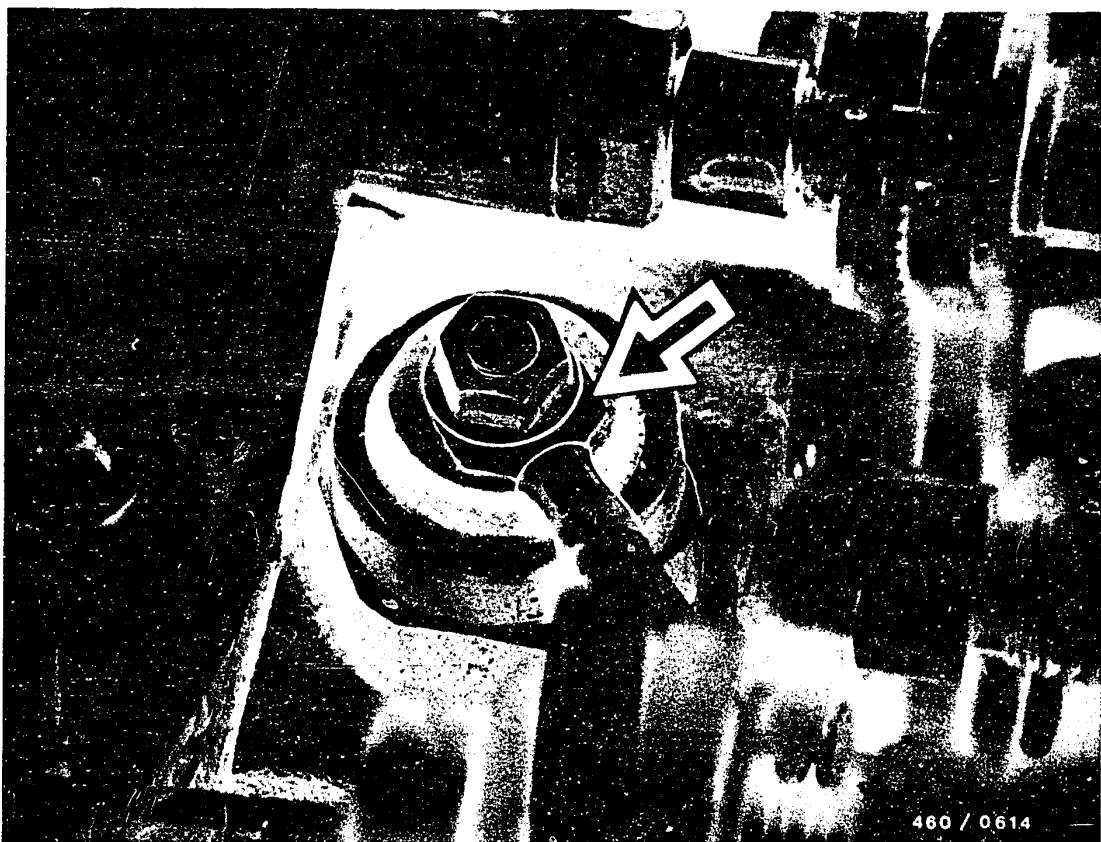
Cleanliness is essential.

When removed, check operation of solenoid-operated valve.

#### Note:

When removed, the solenoid-operated valve must only be supplied with voltage for a short period of time since it is no longer being cooled by the fuel.





### 11.2 Engine cannot be stopped

With the glow-plug and starter switch in the stop position, there must be no voltage across the solenoid-operated valve (arrow), i. e. the fuel inlet at the distributor-pump plunger is interrupted.

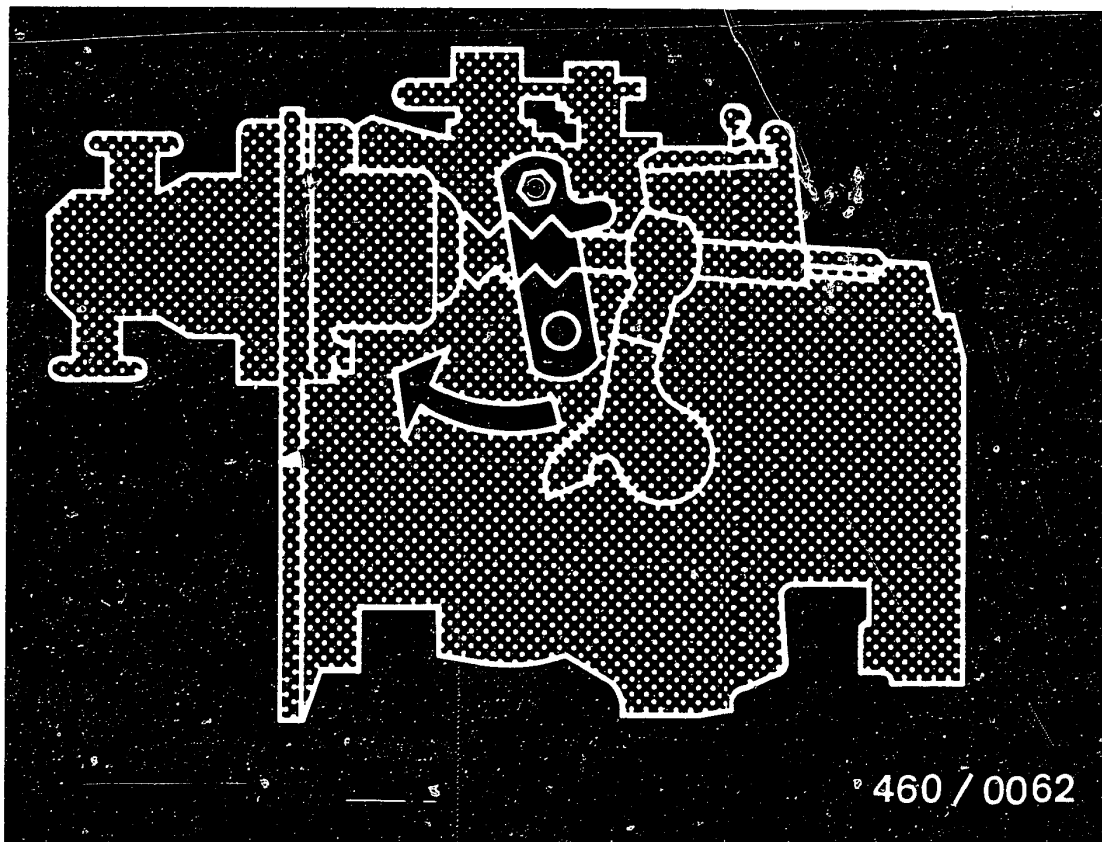
If the engine continues to run, although there is no voltage across the solenoid-operated valve, the engine can be stopped as follows:

#### • Vehicles with manually-shifted transmission

Select 3rd or 4th gear.

Depress the foot brake with full force and let out the clutch.





• Vehicles with automatic transmission

Operate the emergency stop lever on the injection pump (picture).

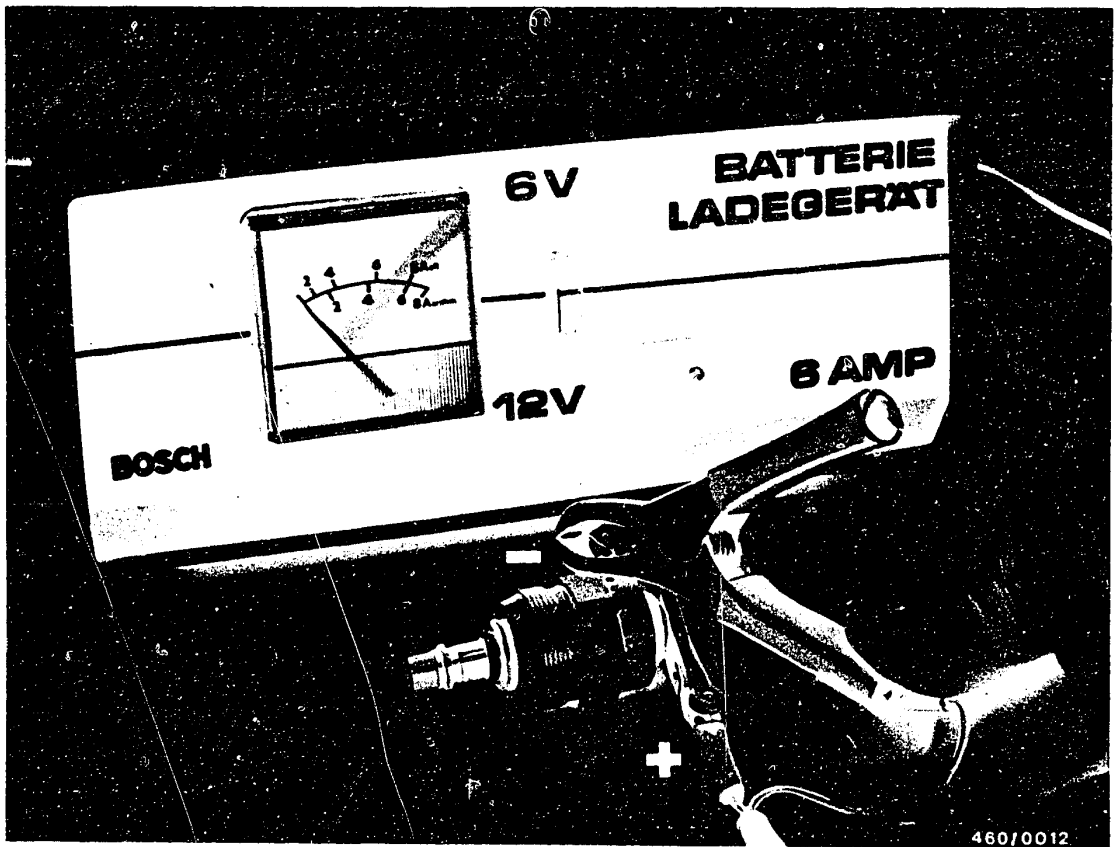
**B11**

Test shutoff device

Renault 18/20 D, 20/30 TD, Fuego TD







### 11.3 Solenoid-operated valve test

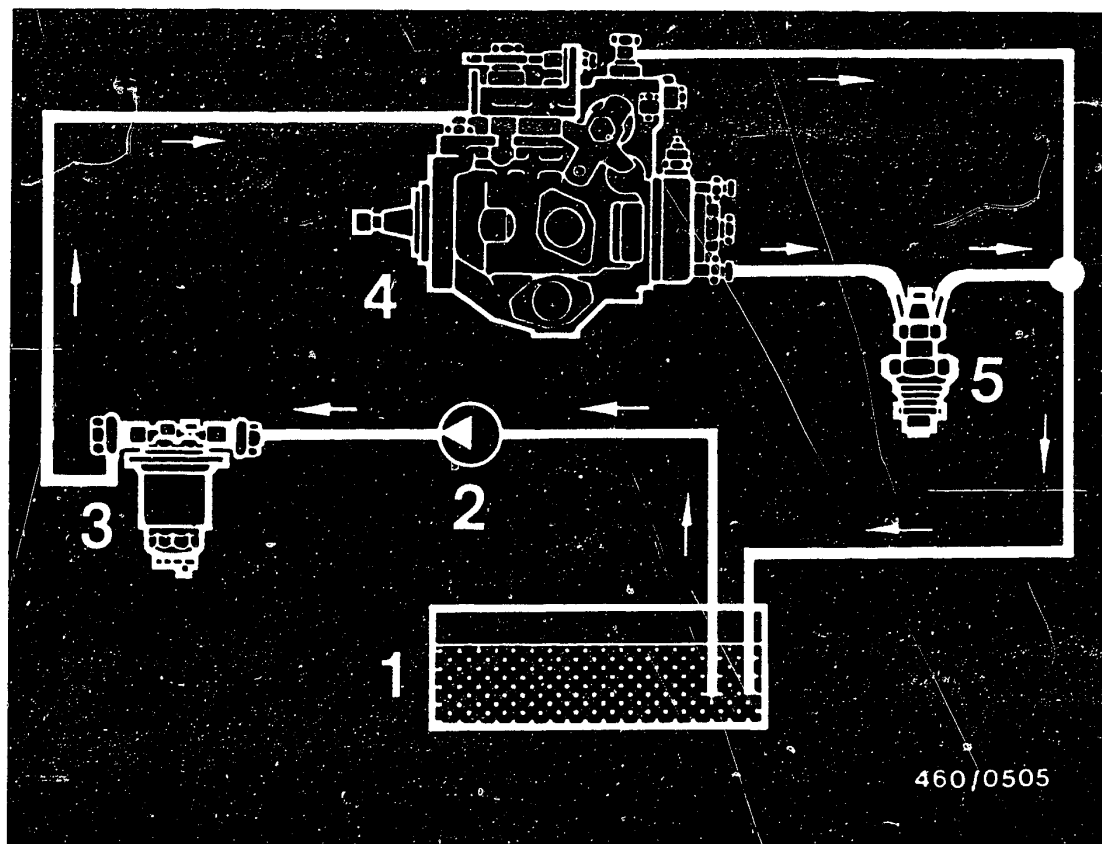
Remove fuel-injection tubing.  
Take out solenoid-operated valve.  
Cleanliness is essential.

When removed, check operation of solenoid-operated valve.

#### Note:

When removed, the solenoid-operated valve must only be supplied with voltage for a short period of time since it is no longer being cooled by the fuel.  
Check valve seat in hydraulic head (visual inspection).





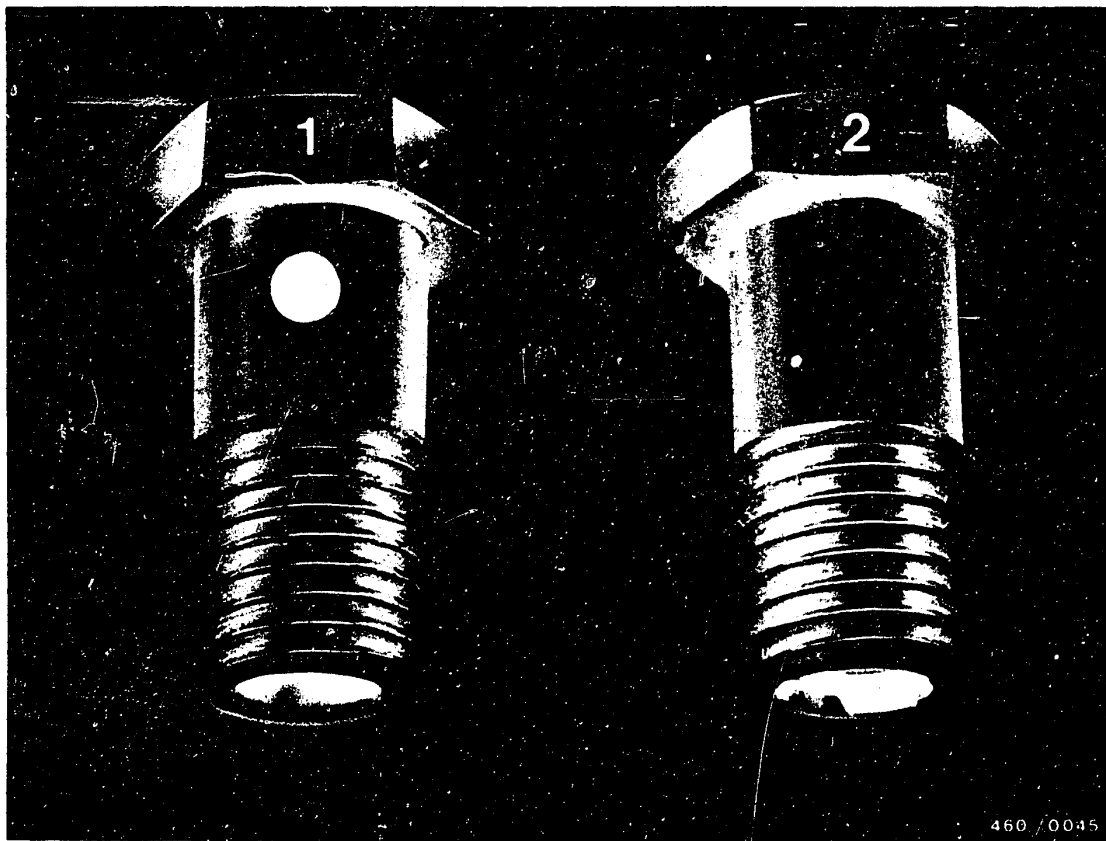
- 1 = Fuel tank
- 2 = Fuel pre-supply pump (on export models only)
- 3 = Fuel filter
- 4 = Distributor-type fuel-injection pump
- 5 = Injection nozzles

## 12. Connection diagram of fuel lines

The fuel lines are connected as shown in the above diagram.

The fuel flows in the direction of the arrows.





As regards the connections to the fuel-injection pump, ensure that the inlet-union screw for fuel inlet (1) and the throttle screw for fuel return (2) are not mixed up.

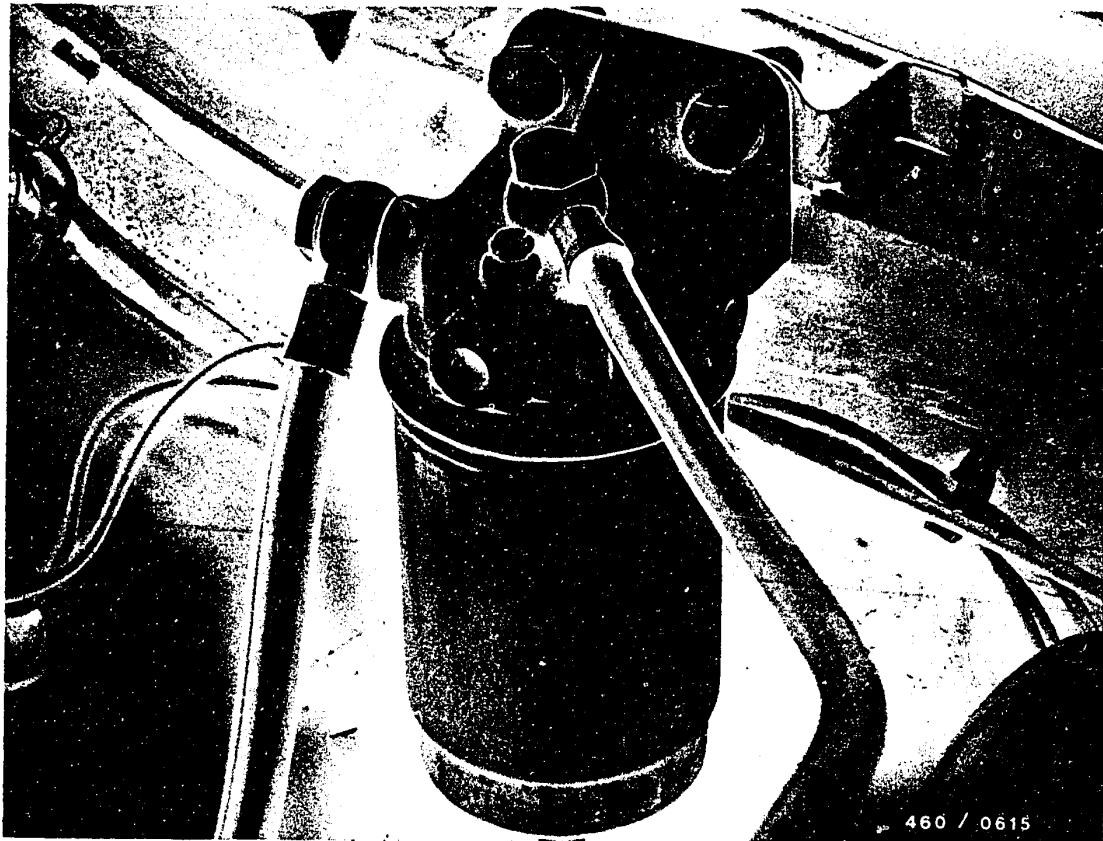
The throttle screw is located on the cover of the fuel-injection pump and the head of the screw is marked with the word "out".

**B14**

Connection diagram of fuel lines

Renault 18/20 D, 20/30 TD, Fuego TD



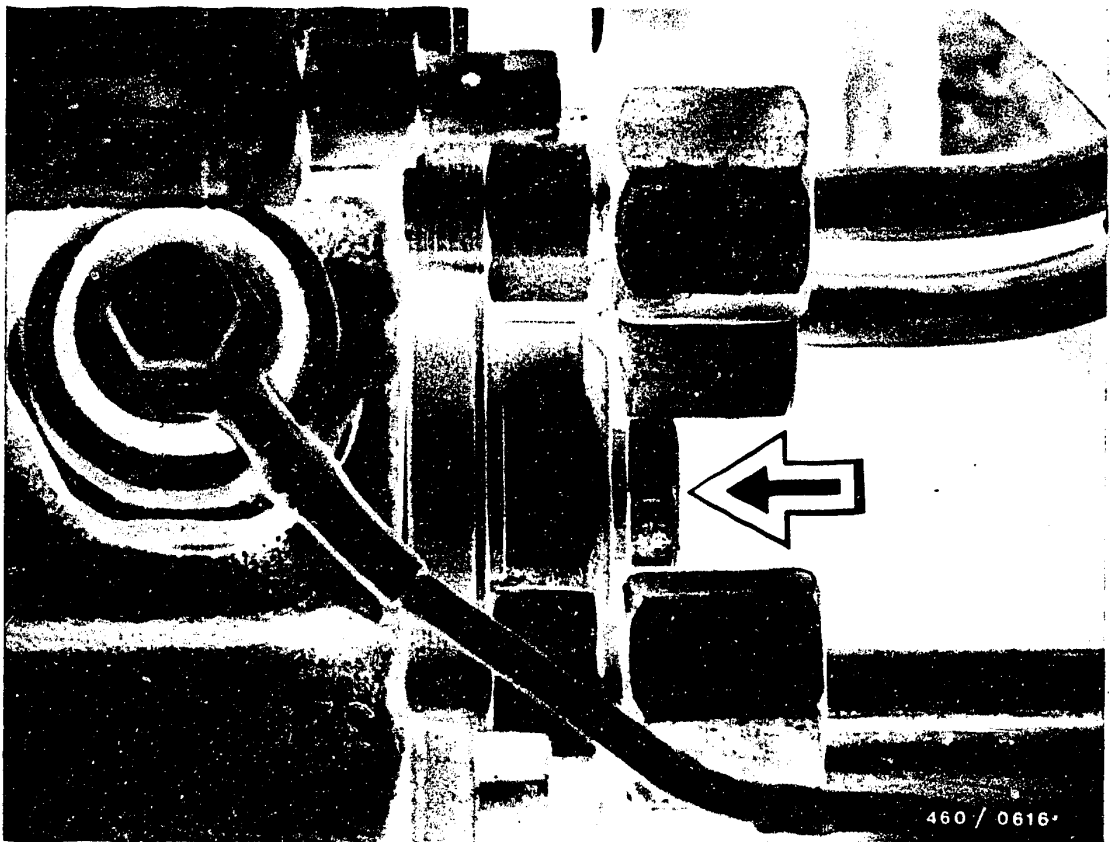


### 13. Bleed fuel system

Fill the fuel filter and injection pump with diesel fuel.

Tighten hose connections on filter cover.





460 / 0616

Loosen bleeder screw on injection pump and screw out by a few turns (arrow).

Loosen union nuts of fuel-injection tubing on nozzle holders.

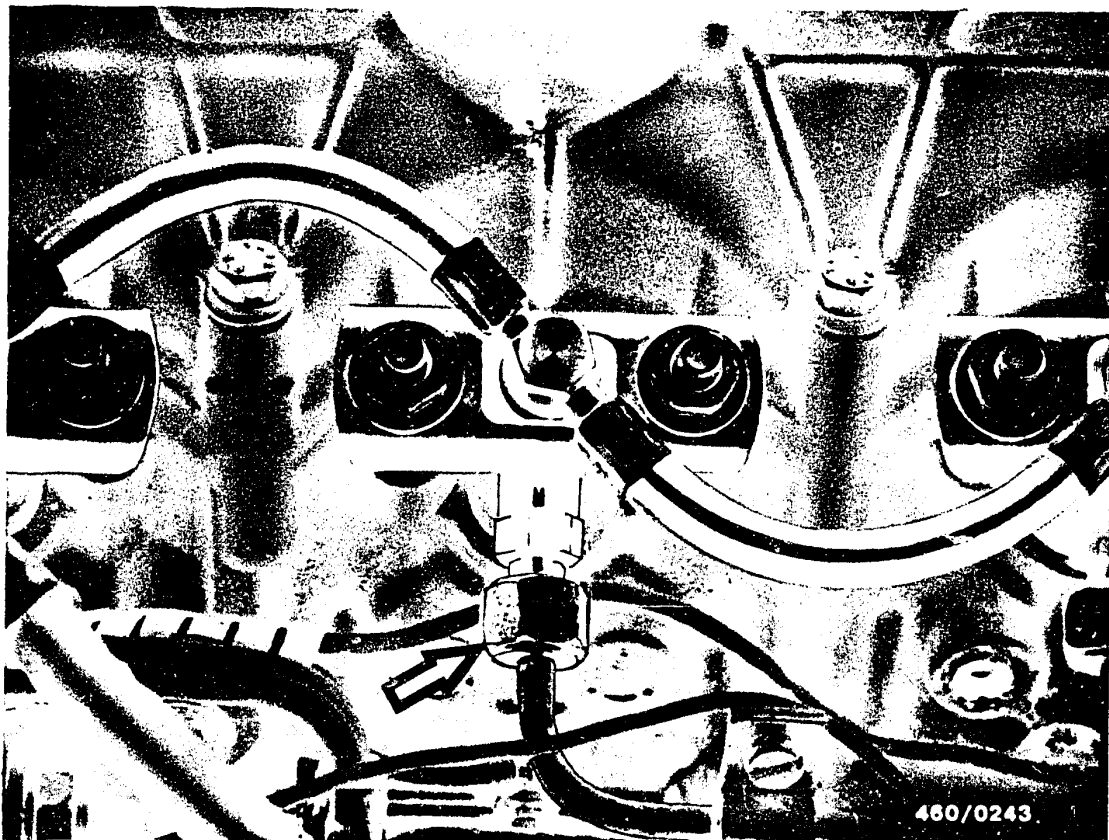
Operate starting motor without preheating. When the fuel escaping from the injection pump bleed hole is free of bubbles, retighten the bleeder screw again.

**B 16**

Bleed fuel system

Renault 18/20 D, 20/30 TD, Fuego TD





Continue to operate starting motor until fuel escapes from the union nuts of the nozzle holders (arrow).

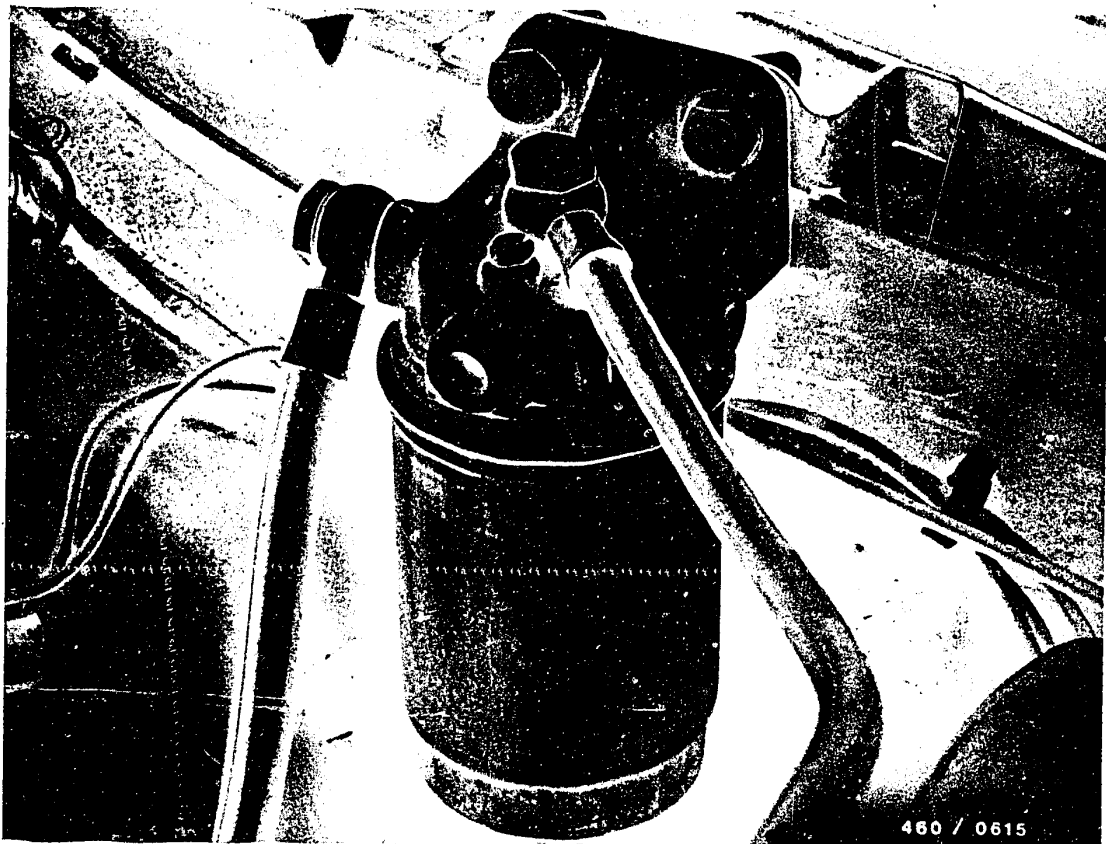
Tighten union nuts and operate starting motor until engine starts.

**B17**

Bleed fuel system

Renault 18/20 D, 20/30 TD, Fuego TD





## 14. Replace and drain water from filter box

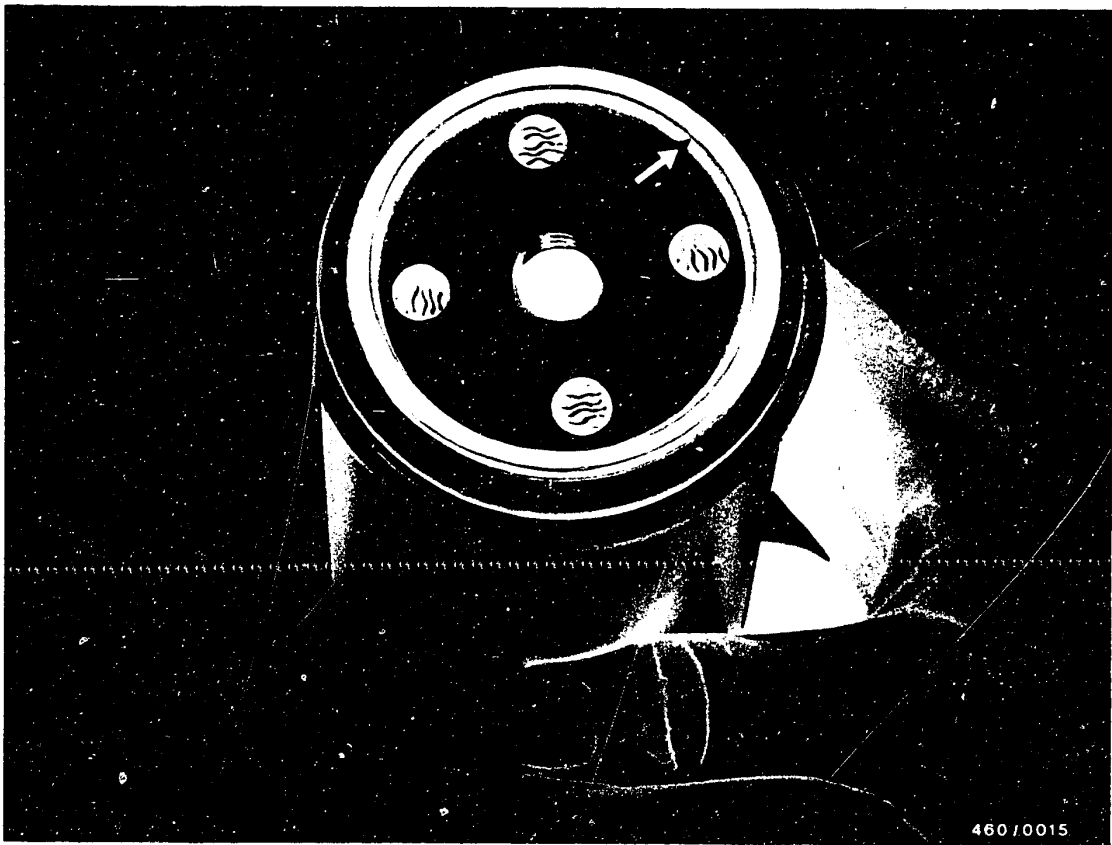
### 14.1 Replace filter box

Unscrew fuel filter from the filter cover.

If stuck, loosen filter box with special wrench, e. g. Matra W 167.

Catch any escaping fuel.





460/0015

Rub diesel fuel into the rubber seal (arrow) of the new filter box.

Screw the filter box into the cover by hand and tighten.

Check the fuel filter for leaks.

In the case of winter fuel it may be necessary to add petroleum as specified by the vehicle manufacturer.

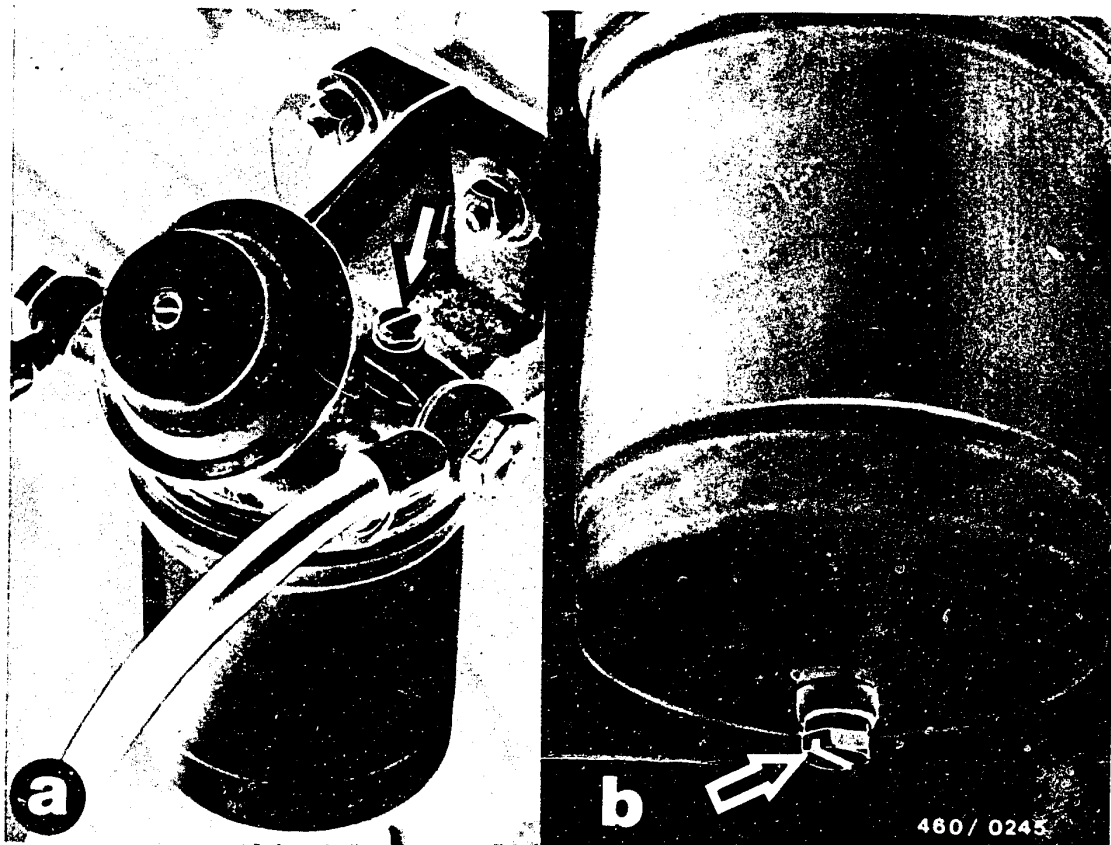
**B19**

Replace and drain filter box

Renault 18/20 D, 20/30 TD, Fuego TD







#### 14.2 Drain water from fuel filter

Loosen bleeder screw (arrow - Fig. a) on the filter cover by a few turns.

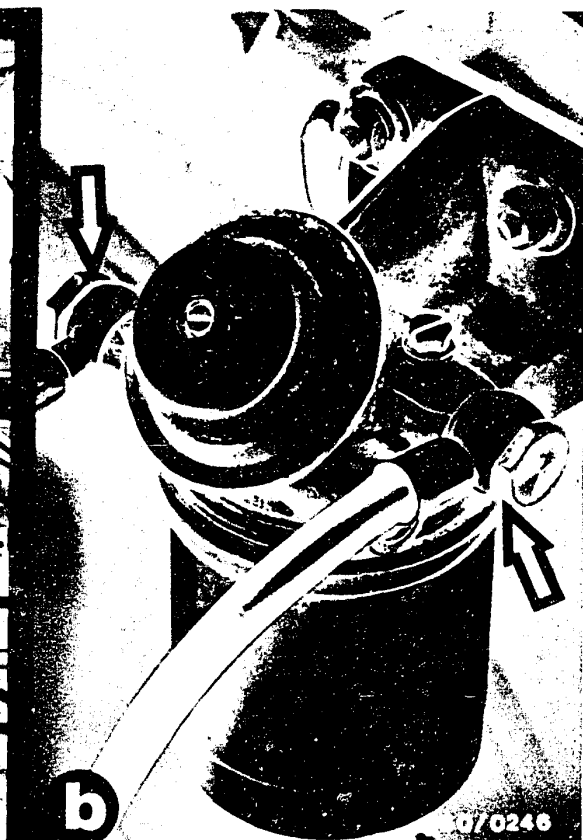
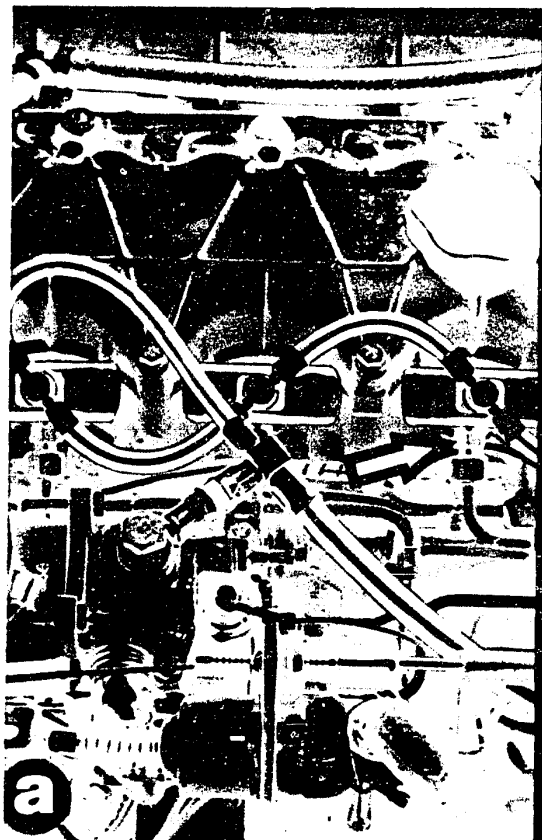
Loosen water-drain screw on base of filter (arrow - Fig. b) and drain water.

Catch liquid in container.

Tighten water-drain screw and bleeder screw and check for leaks.

If necessary, bleed fuel filter.





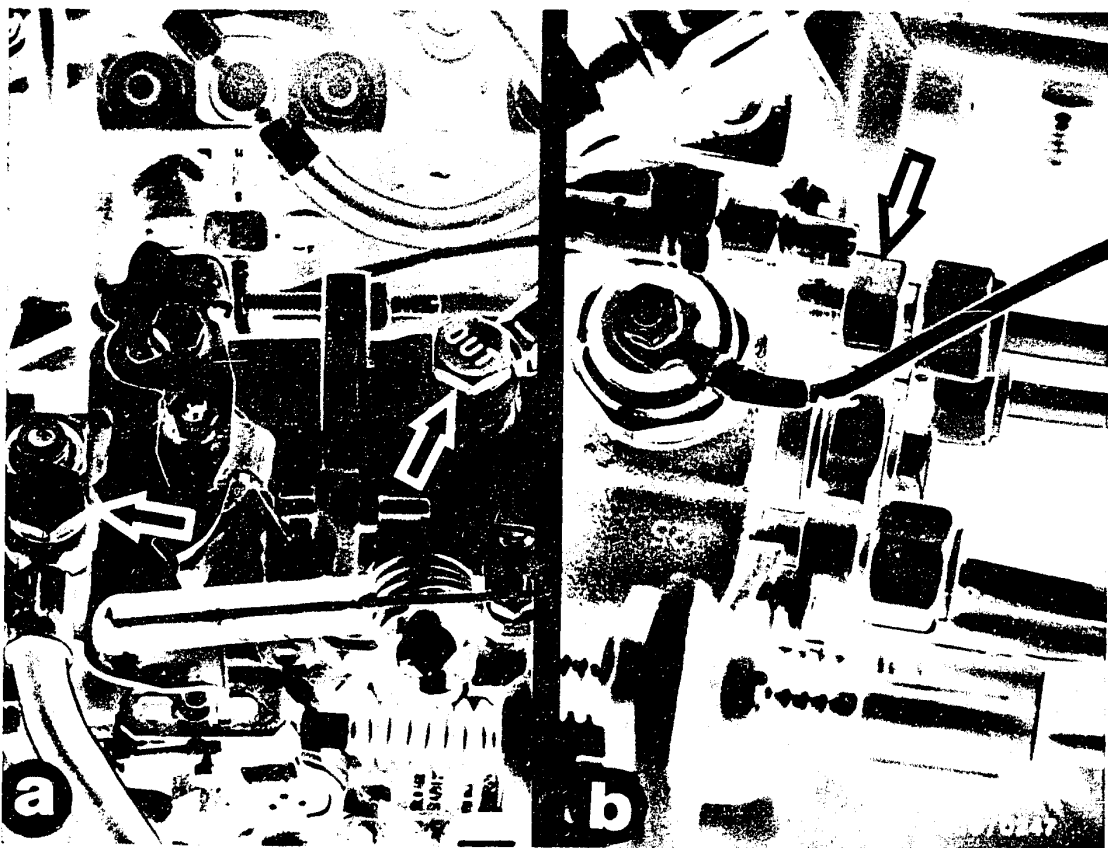
### 15. Check fuel-injection system for leaks

Perform leak test with engine at normal operating temperature.

During leak test, check all fuel line connection points. Pay particular attention to:

- Connections on nozzle-holder assemblies (arrow, Fig. a)
- Connections on fuel filter (arrows, Fig. b).

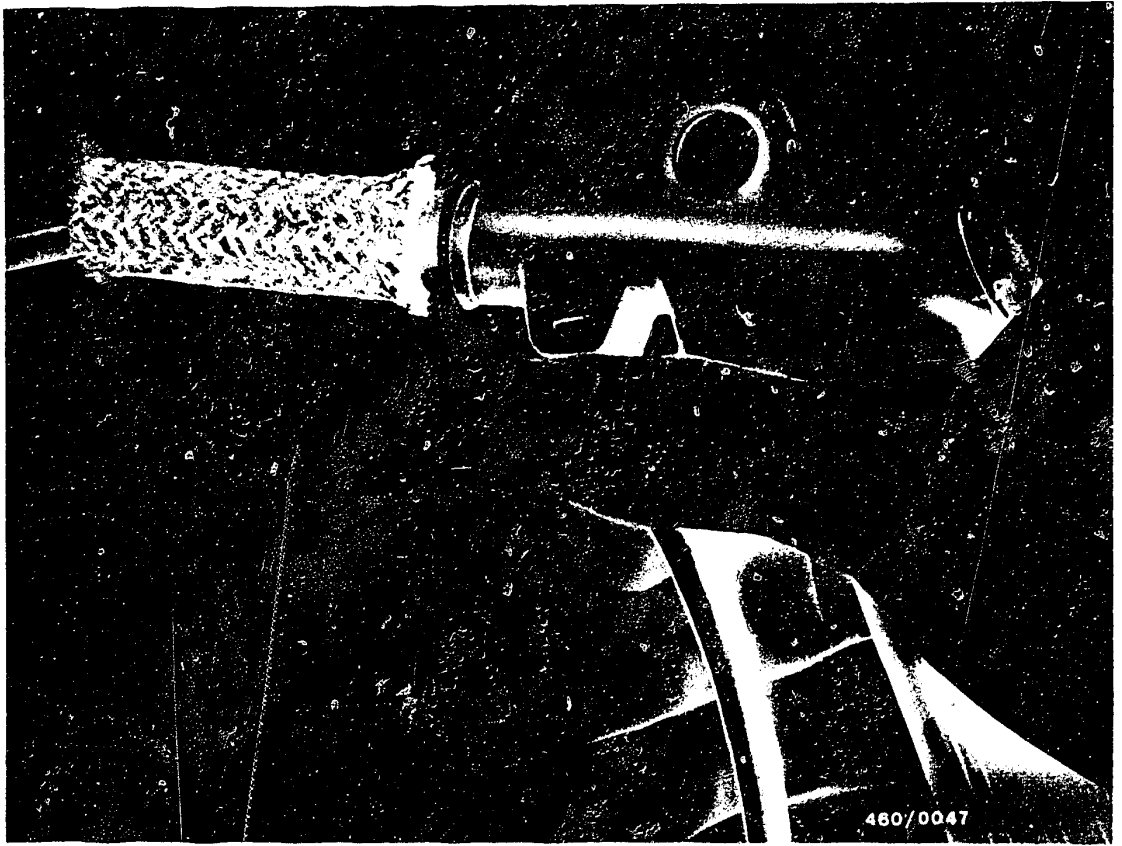




- Fuel inlet and return lines on distributor-type fuel-injection pump (arrows, Fig. a).
- Delivery-valve holders on hydraulic head (arrow, Fig. b).

Perform visual inspection of fuel lines for hairline cracks.





#### 16. Check fuel lines

Subject suspect fuel lines to a visual inspection.

If there is no detectable pinching or kinking, the fuel line in question must be removed.

Check fuel line for throughflow using compressed air and clean if necessary.

A suitable hose piece may be used as a side seal for blowing out the fuel lines.



## 17. Smoke test - check air filter

### 17.1 Smoke test

Summary of the contents of the legal regulations (as at April 1978). Applicable to Federal Republic of Germany.

This regulation applies only to the homologation of motor vehicles having at least 4 wheels with a maximum permissible speed of more than 25 km/h. A smoke emission test is not prescribed for official general inspections.

Parts which may have an influence on environmental pollution must be designed in such a way that the legal requirements are met during operation and despite vehicle vibration.

This applies in particular to cold-start devices and full-load stops. The Rheinland-Westfälische TÜV (Technical Inspection Bureau of Rhineland-Westfalia) in Essen is the sole approval agency.

**C1**

Smoke test

Renault 18/20 D, 20/30 TD, Fuego TD





### 17.1.1 Test setup

The smoke test is conducted using the Bosch filter-type smokemeter.

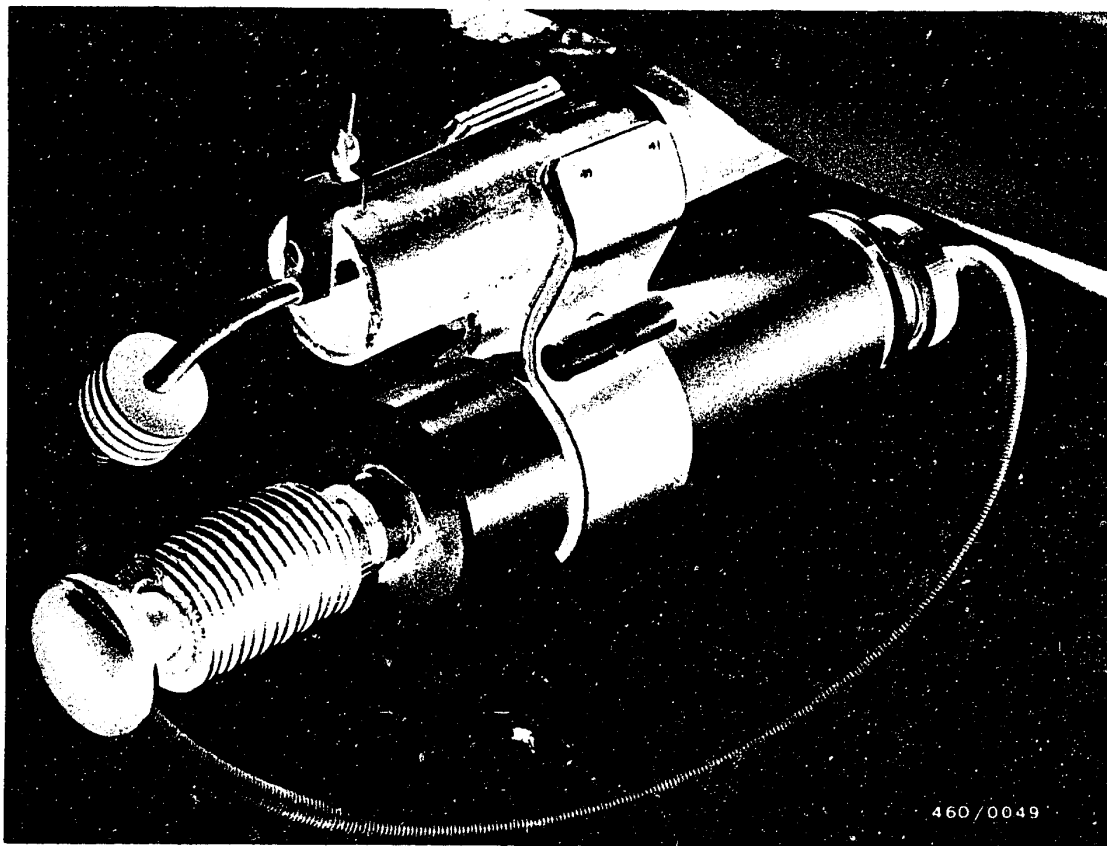
The filter-type smokemeter consists of the following units:

Accessories box with proportioning pump      0 681 169 038

Evaluating unit      0 681 169 039

Insert filter plate into proportioning pump.





460/0049

Mount sampling pump on exhaust pipe using appropriate clamp.

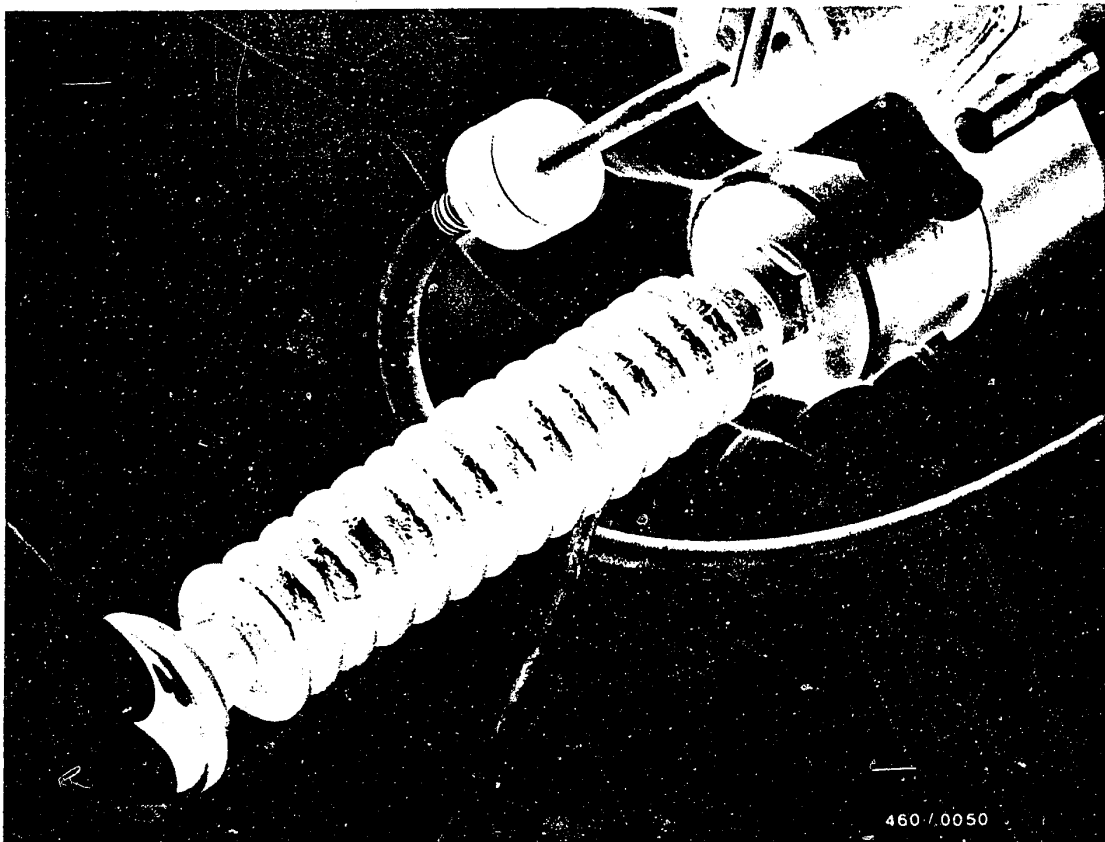
Introduce exhaust-sample pickup as far as possible into exhaust pipe and clamp in position.

**C3**

Smoke test

Renault 18/20 D, 20/30 TD, Fuego TD





### 17.2 Test procedure

Set proportioning pump by pressing in the black push-button.

Take rubber ball on triggering hose and enter passenger compartment.

The test can be performed on the chassis dynamometer or on the road (gradient).

The chassis dynamometer is preferable in any case. Find the gear in which, with the accelerator pedal in the full-load position, a speed of approx. 40 km/h is reached. Load the engine so that, with the accelerator in the same position, a speed of approx. 25 km/h is reached.

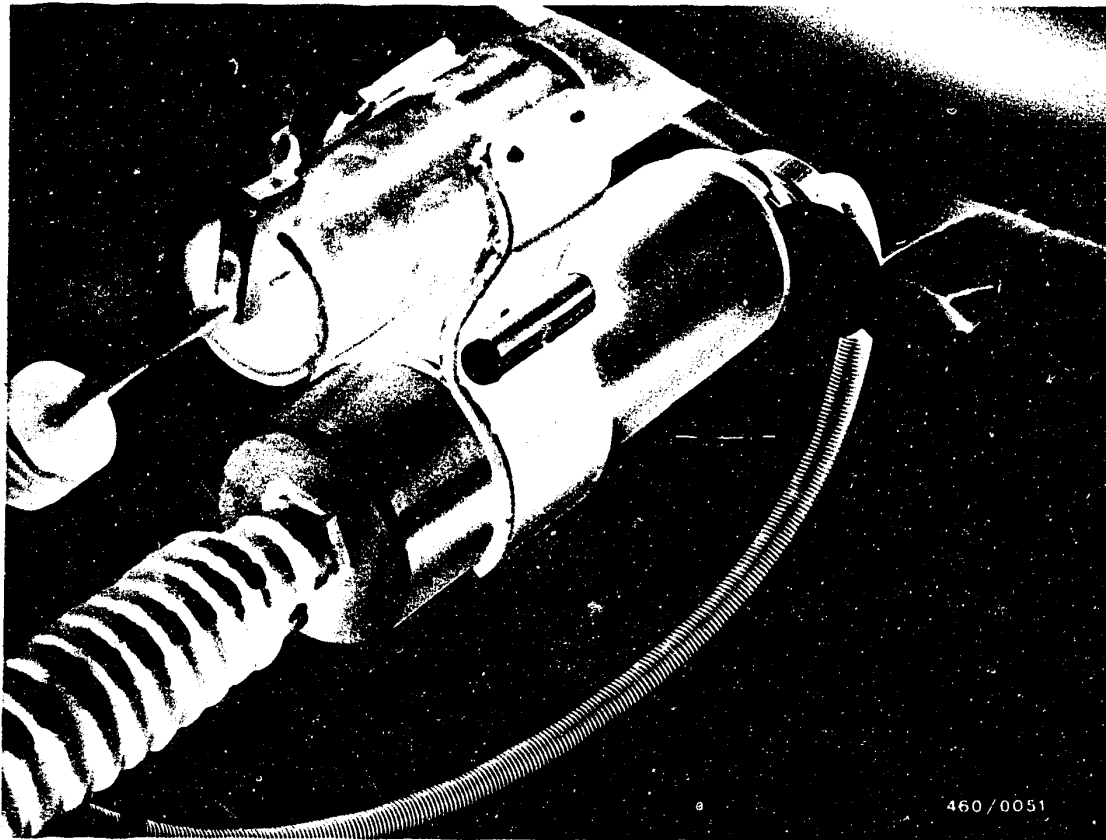
**C4**

Smoke test

Renault 18/20 D, 20/30 TD, Fuego TD







Maintain this load condition for 5 seconds and then trigger the sampling pump by pressing the rubber ball.

Switch off engine.

Caution!

During the following operation, pay attention to the fact that the exhaust pipe has been heated due to the running of the engine.

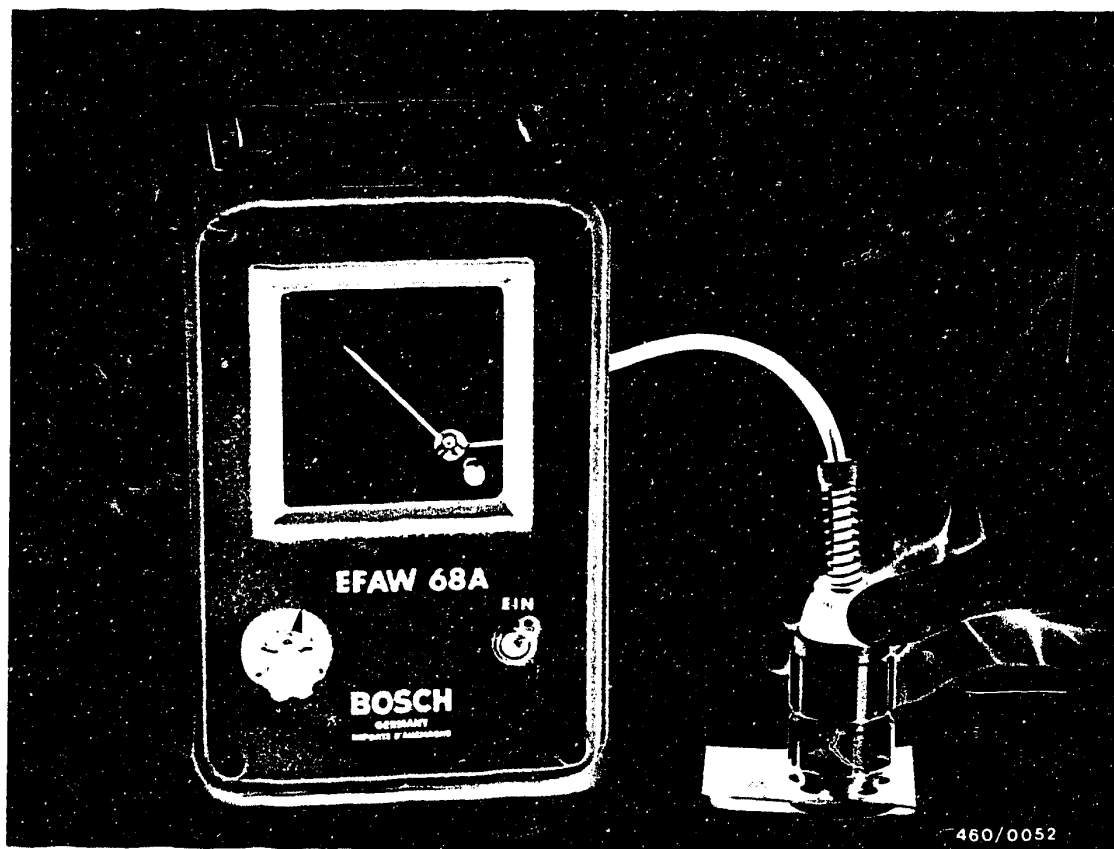
Remove filter plate from sampling pump.

**C5**

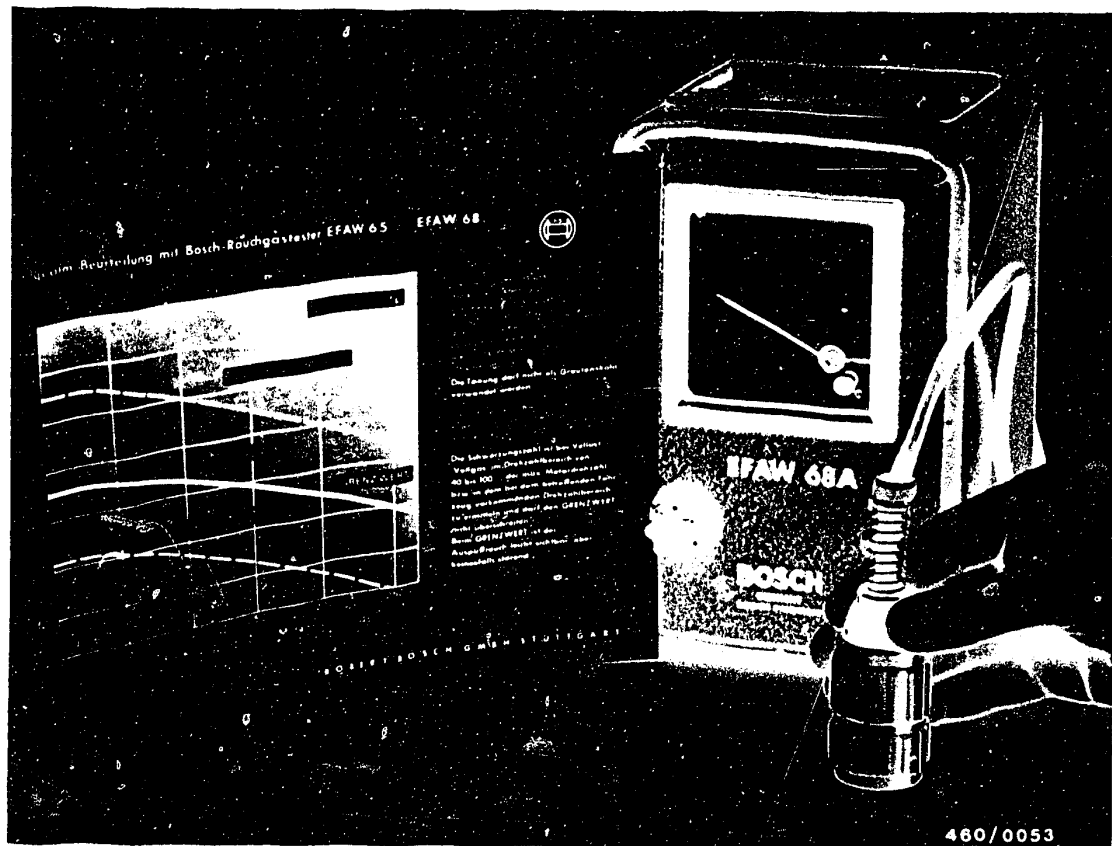
Smoke test

Renault 18/20 D, 20/30 TD, Fuego TD





Place calibrating plate on approx. 10 clean filter plates. Place photocell of evaluating unit on calibrating plate. Switch on unit and set to 5.0 opacity. Remove calibrating plate and place photocell on clean filter plates. The unit must indicate 0.0 opacity. If necessary, change batteries. With unit switched off, pointer must indicate 10.0 opacity. Deviations indicate that the unit is defective. Place filter plate from sampling pump onto the clean filter plates with the sooted side at the top. Place photocell on this filter plate and read off the smoke factor on the evaluating unit.



Compare smoke factor with evaluation sheet.

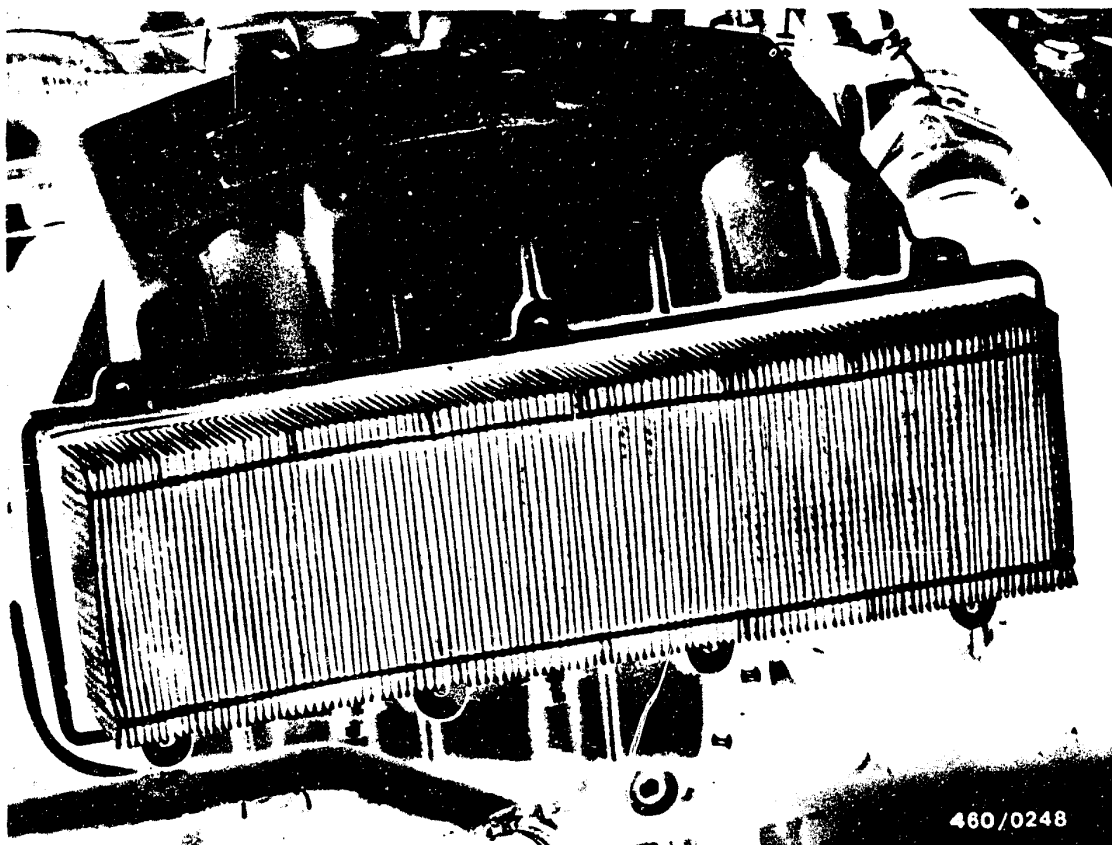
Note kW (HP-DIN) data of vehicle manufacturer.

**C7**

Smoke test

Renault 18/20 D, 20/30 TD, Fuego TD





### 17.3 Check air filter

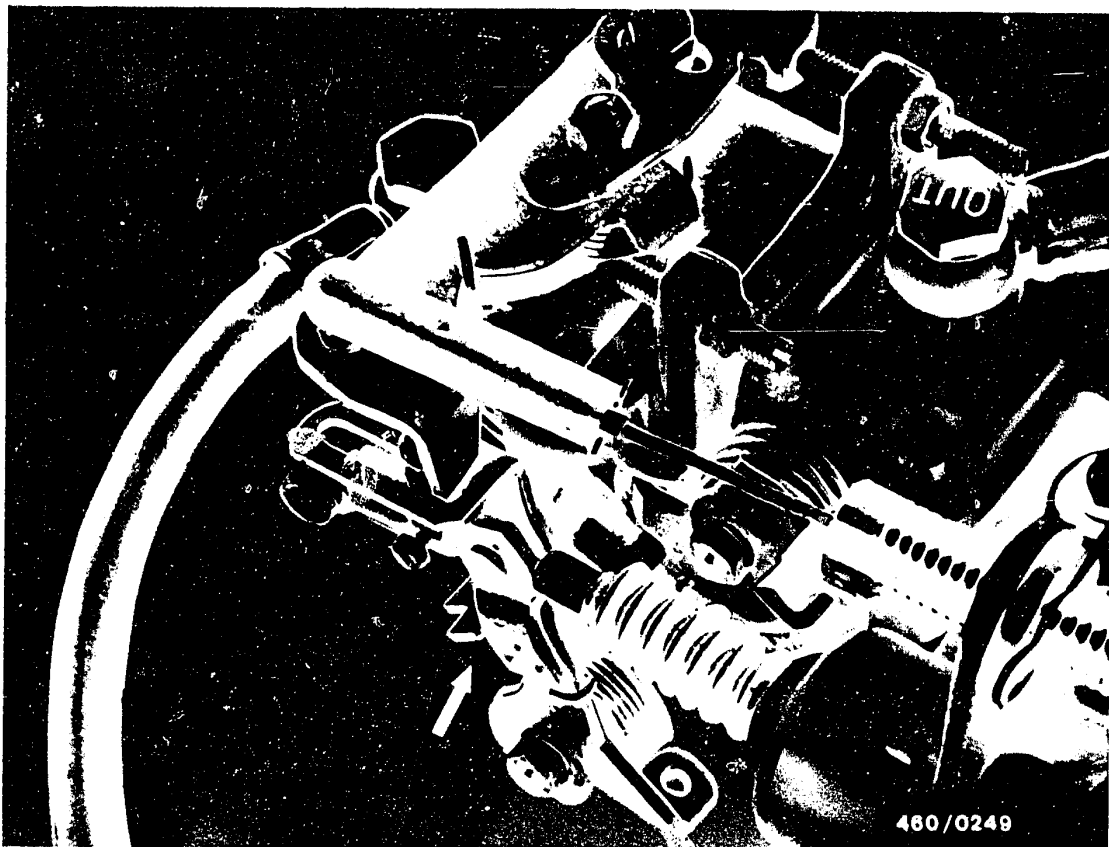
Remove air filter and subject to a visual inspection.

#### Test criteria for air filter:

- Dusty air filter  
(test by knocking out air filter)
- Oil-fouled air filter
- Solid matter in air filter, e. g. leaves

If in doubt, use new filter element.





### 18. Adjust idle speed

Connect tachometer (e. g. photoelectric) to engine.

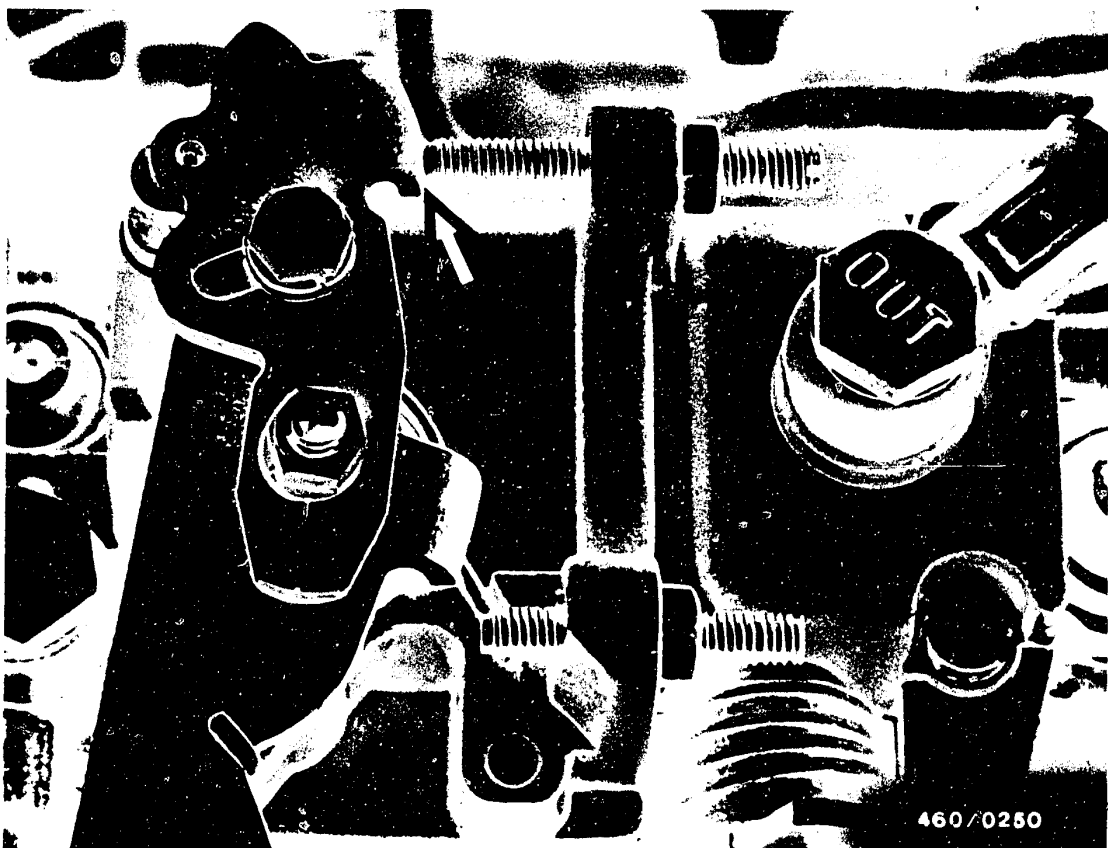
Start engine and run at idle speed.

#### Note:

In order to adjust the idle speed the engine must be at normal operating temperature. The control lever of the cold-start accelerator must be up against the stop bracket (arrow).

Coolant temperature 80°C.





### Renault 18/20 D

Adjust idle speed at idle-speed adjusting screw (see picture, arrow) to  $725 \pm 25 \text{ min}^{-1}$ .

Note that the camshaft and the injection pump are driven at half the engine speed.

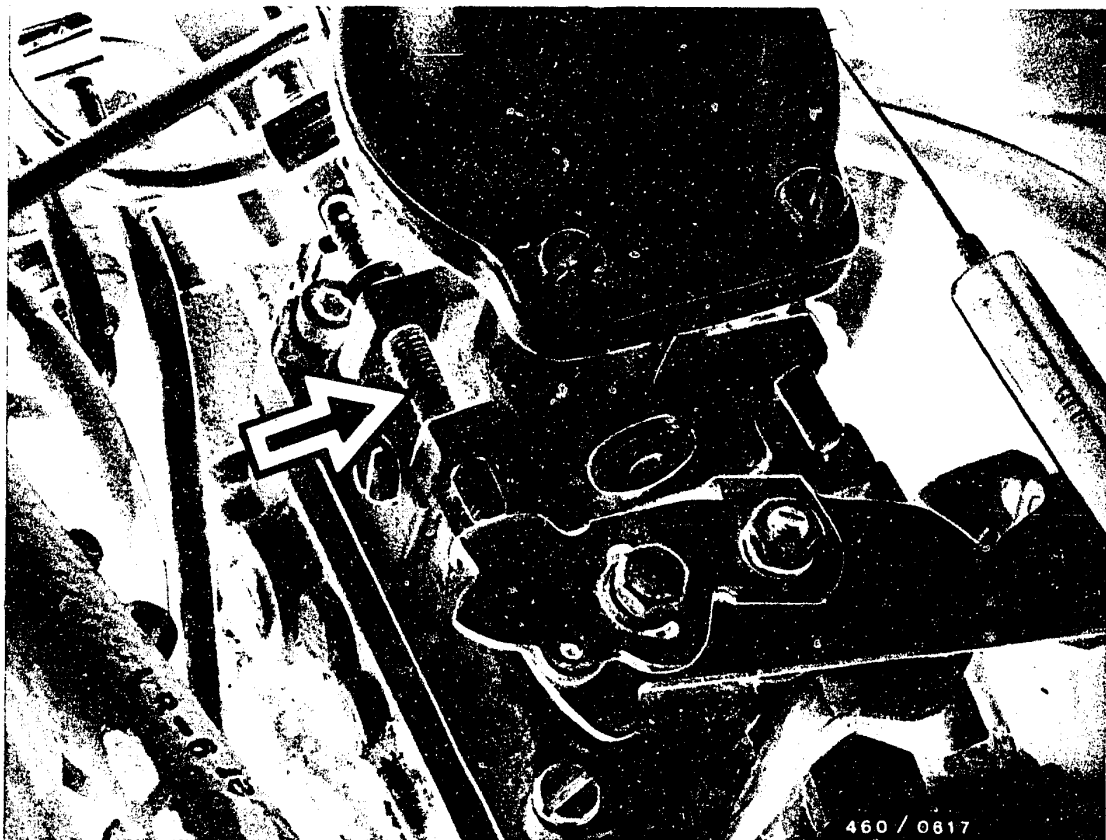
After adjusting, lock and seal the adjusting screw.

**C10**

Adjust idle speed

Renault 18/20 D, 20/30 TD, Fuego TD





Renault 20/30 TD, Fuego TD

Adjust idle speed at idle-speed adjusting screw (see picture, arrow) to  $675 \pm 25 \text{ min}^{-1}$ .

Note that camshaft and injection pump are driven at half the engine speed.

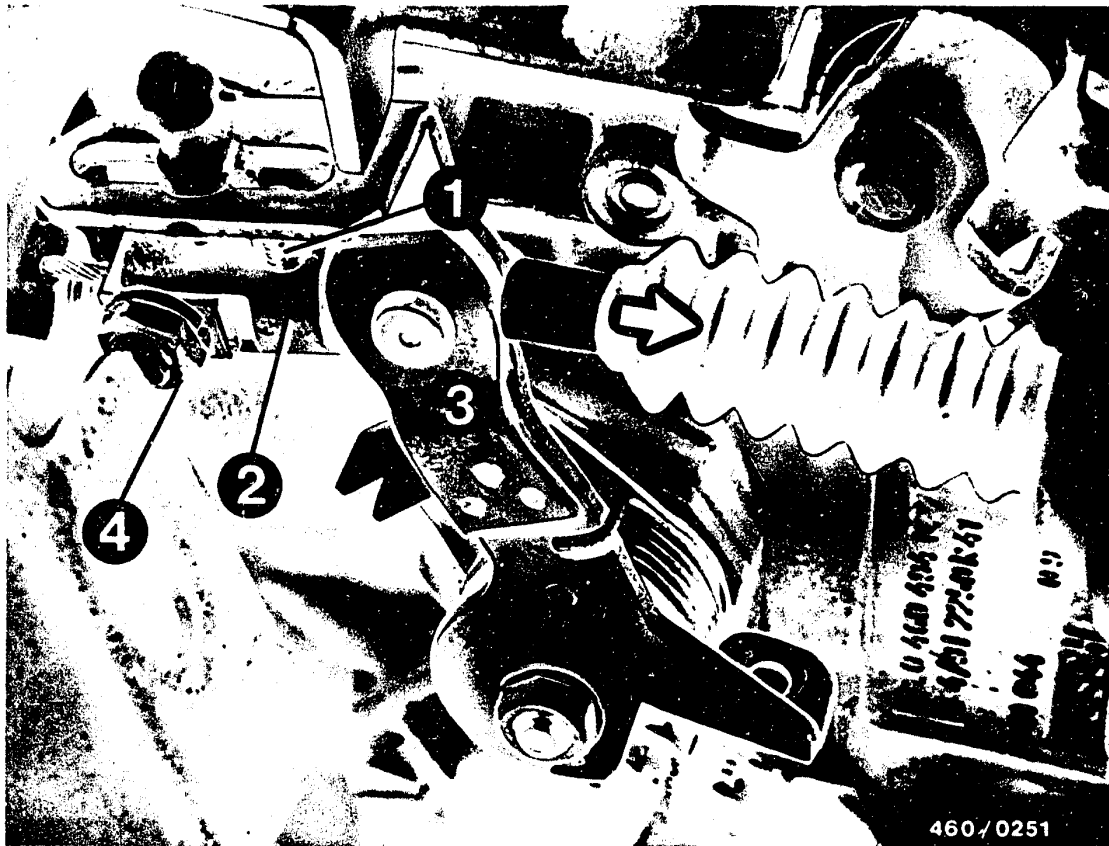
After adjusting, lock and seal the adjusting screw.

**C11**

Adjust idle speed

Renault 18/20 D, 20/30 TD, Fuego TD





### 18.1 Adjust throttle cable

Loosen clamping screw (1) on injection pump.  
Pull intermediate piece (2) with control lever (3) in direction of hydraulic head (arrow).

Turn intermediate piece (2) through 90° and push again toward drive shaft until stop lever (3) comes up against stop bracket.

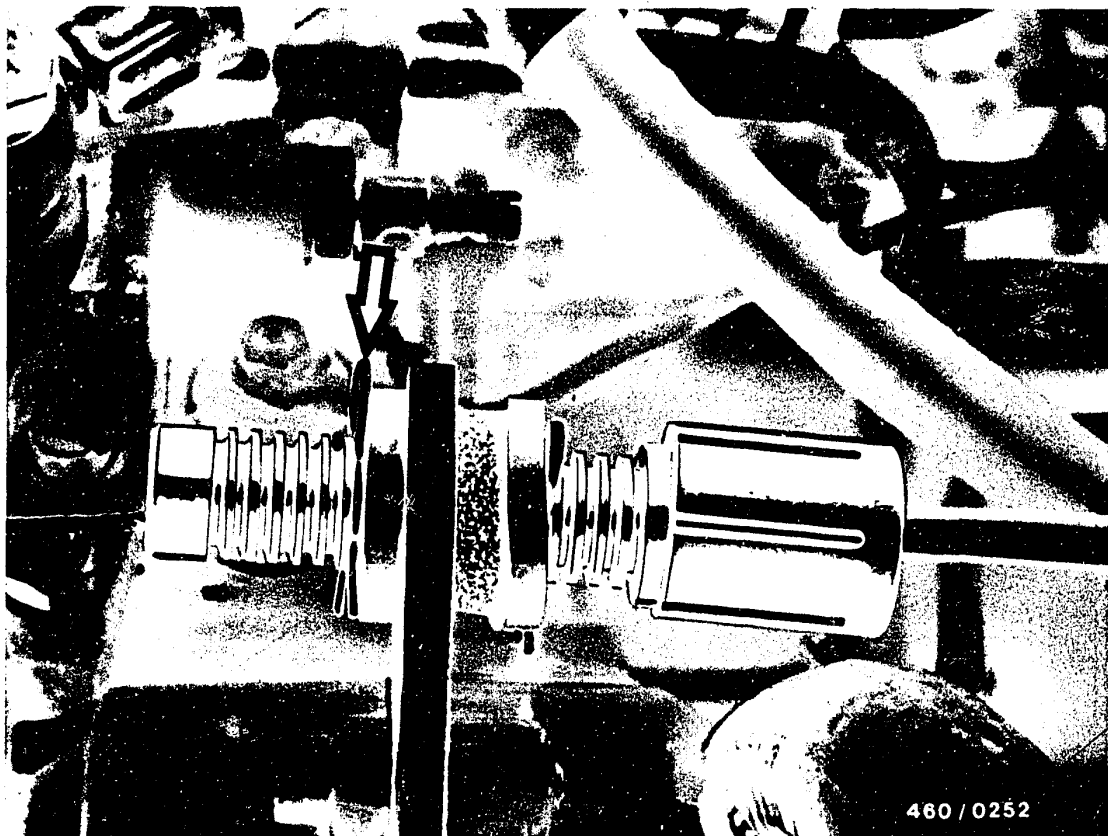
In this position, the control device is switched off (picture).

#### Note:

Nut (4) must not be loosened since, otherwise, it would be necessary to re-set the control device.







460 / 0252

Hook throttle cable into control lever on injection pump.

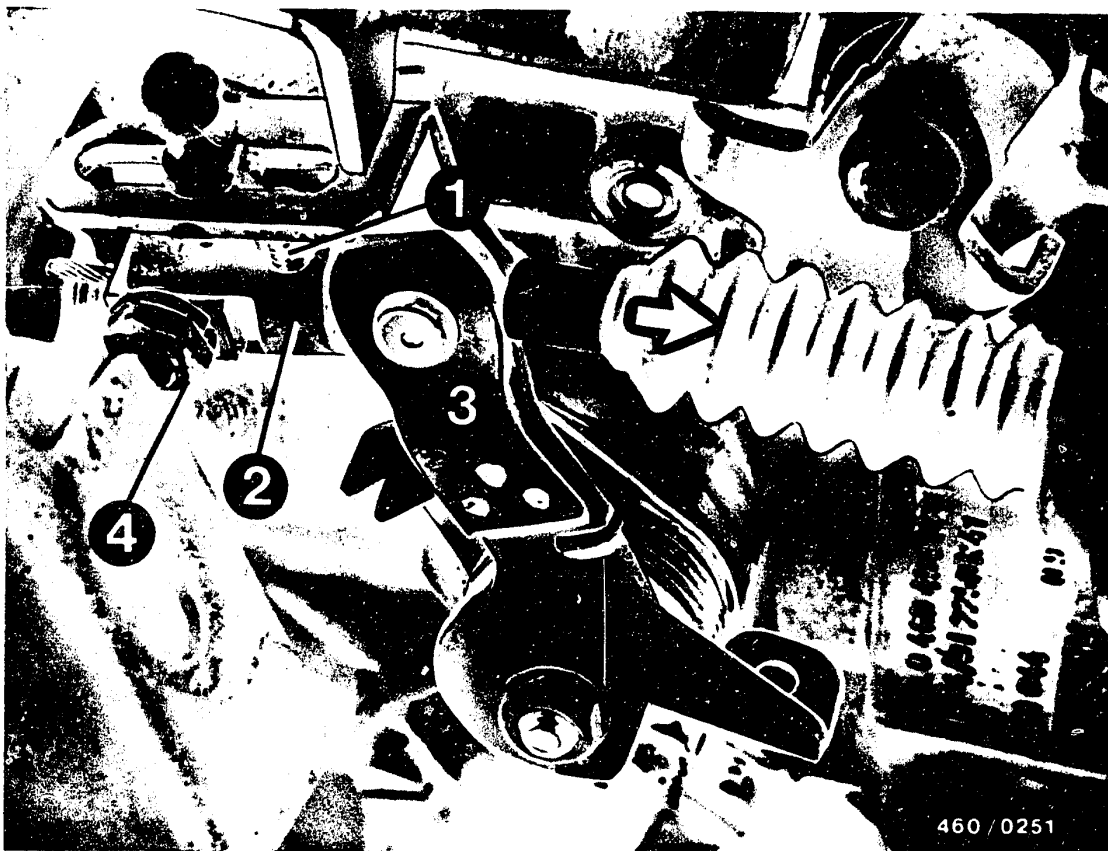
Fit guide sleeve by means of holding clamps (arrow) so that it is free of tension.

**C13**

Adjust idle speed

Renault 18/20 D, 20/30 TD, Fuego TD





Pull control lever (3) with intermediate piece (2) in direction of hydraulic head (arrow).

Turn intermediate piece (2) through 90° and push again toward drive shaft.

The intermediate piece is in the starting position.

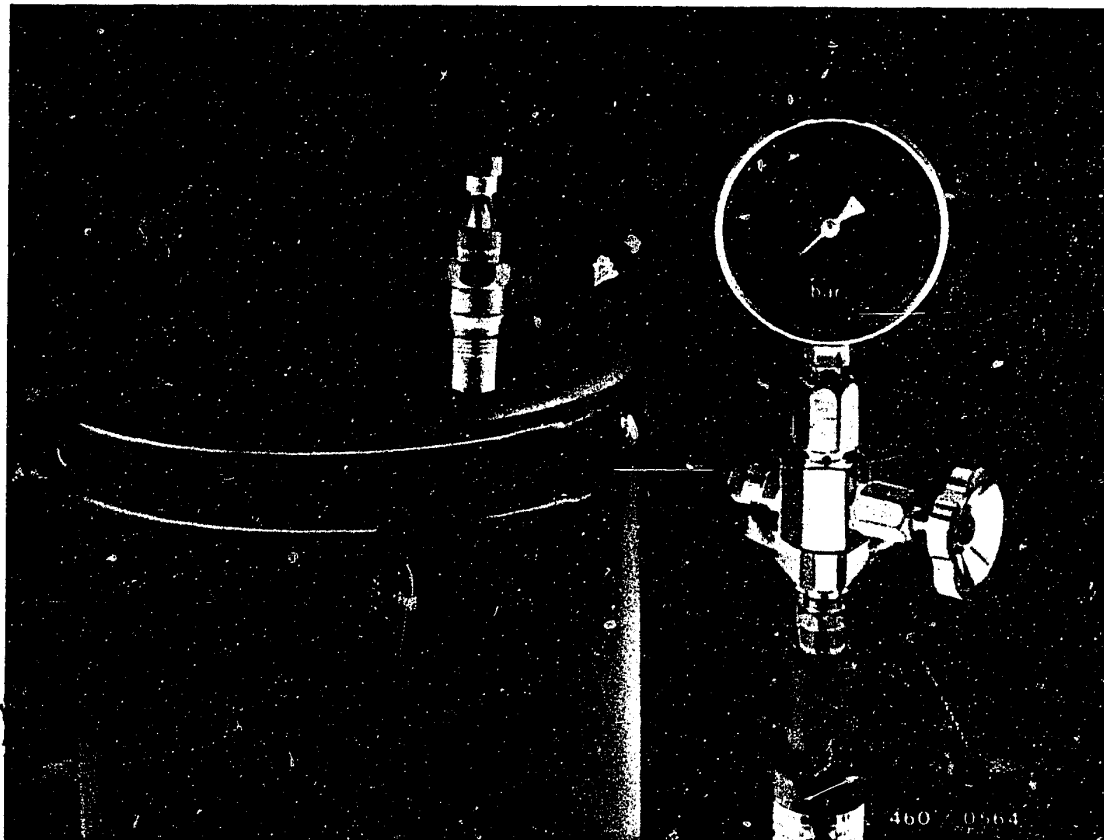
Tighten clamping screw (1)

**C14**

Adjust idle speed

Renault 18/20 D, 20/30 TD, Fuego TD





### 19. Test injection nozzles

Remove injection nozzles.

The test is performed using the nozzle tester EFEP 60 H 0 681 200 502.

Mount injection nozzle with nozzle-holder assembly on nozzle tester.

#### Caution:

When testing injection nozzles, make sure that the fuel spray does not strike your hands since, due to the high pressure, the fuel will penetrate into the skin and may cause blood poisoning.



For testing, use calibrating oil ISO 4113 or kerosene.

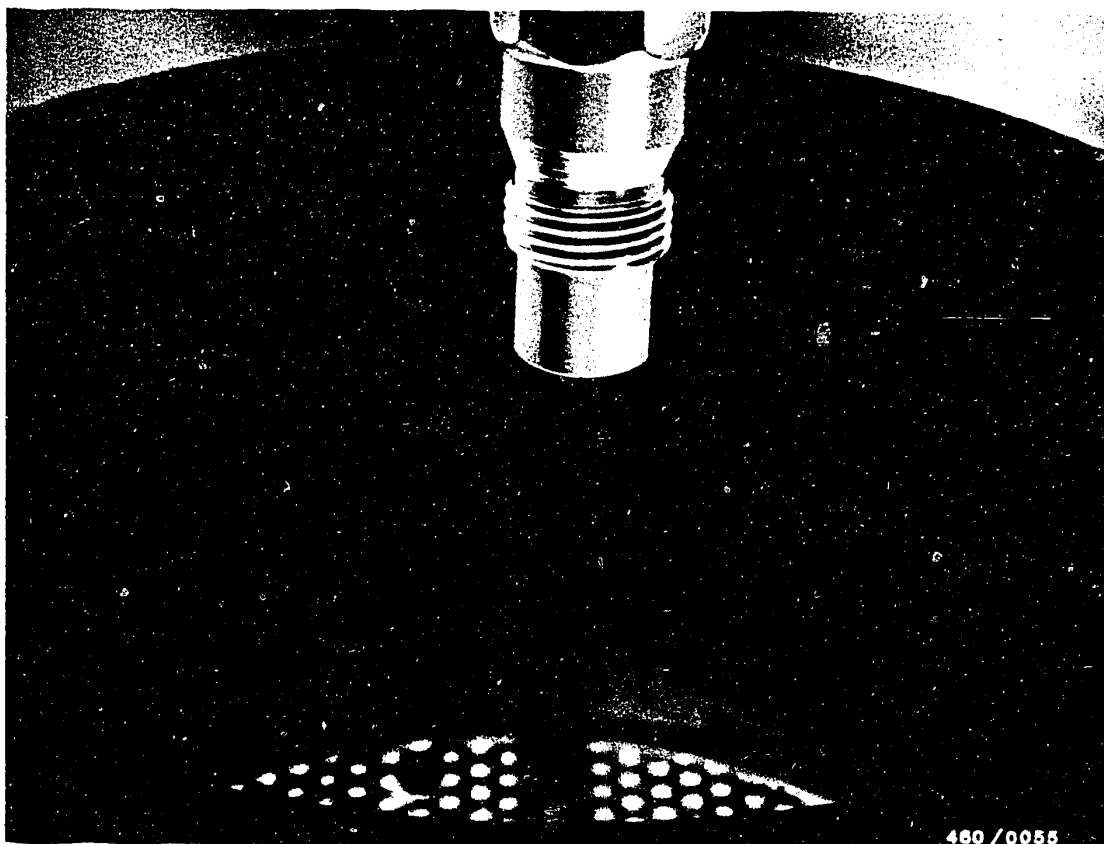
Use kerosene only if it has the following properties:

|               |                                                  |
|---------------|--------------------------------------------------|
| Viscosity     | = 1.0 ... 2.8 mm <sup>2</sup> /s (1.0 ... 1.2°E) |
| Density       | = 0.7 ... 0.81                                   |
| Boiling range | = 150 ... 200° C                                 |
| Flash point   | = min. 245° C                                    |

Note:

When working with kerosene, be sure to observe the local official fire prevention regulations.





460 / 0055

### 19.1 Spray test

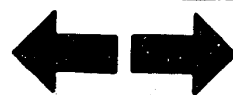
Switch off pressure gauge.

The spray pattern cannot be assessed until when the lever is being operated quickly (approx. 4-6 strokes per second). The spray must be quite concentrated and break off cleanly.

**C17**

Test injection nozzles

Renault 18/20 D, 20/30 TD, Fuego TD



## 19.2 Chatter test

Pressure gauge is off.

Fully press lever of tester slowly (1 ... 2 strokes per second).

Good nozzles must chatter as soon as fuel escapes.

## 19.3 Test injection pressure

Switch on pressure gauge.

Slowly press lever downward.

Read off injection pressure when fuel begins to squirt.

In case of deviations from the set value the nozzle-opening pressure must be corrected by shims behind the pressure spring in the nozzle-holder assembly.

Set value

130 + 8 bar

Thicker shims = higher nozzle-opening pressure

Thinner shims = lower nozzle-opening pressure

Increasing the spring travel by 0.05 mm causes an increase of the nozzle-opening pressure of 5.0 bar.

## 19.4 Leak test

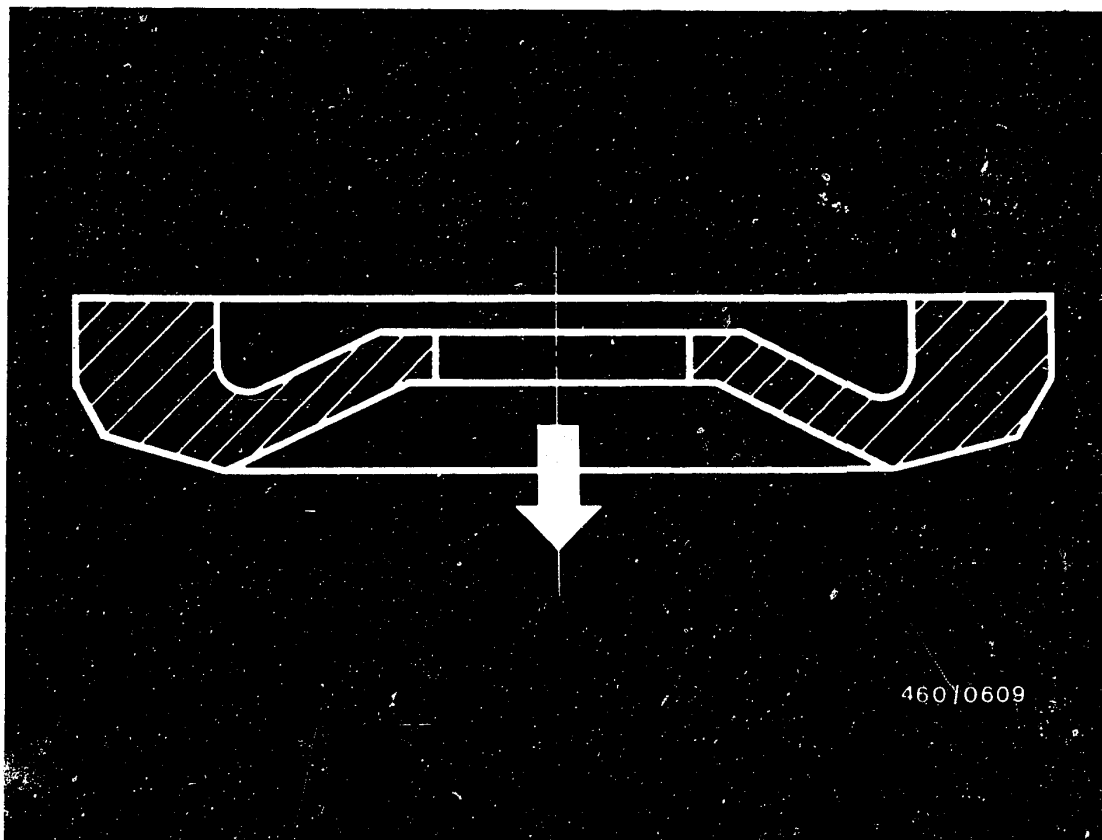
Pressure gauge on.

Slowly press lever downward and maintain pressure approx.

20 bar below the opening pressure for 10 seconds. No

drop may fall from the nozzle.





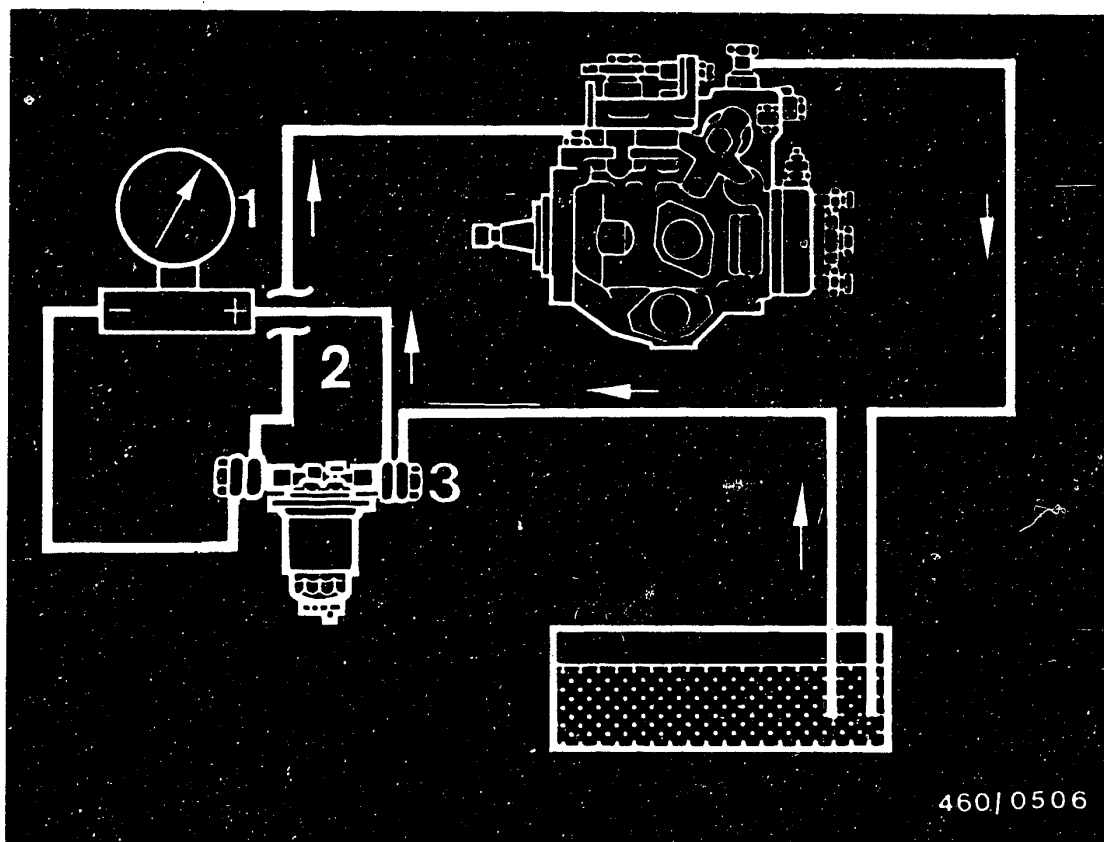
### 19.5 Install injection nozzles

Before installing the injection nozzles, fit a new heat seal in the direction of the arrow with respect to the cylinder head (Picture).

Tighten the fastening screws of the nozzle-holder assembly to 17 Nm (1.7 kgfm).

Tighten the union nuts of the fuel-injection tubing to 25 Nm (2.5 kgfm).





460/0506

- 1 = Differential-pressure gauge
- 2 = Filter outlet (use inlet union and extra-long inlet-union screw 2 443 456 020).
- 3 = Filter inlet (use inlet union and extra-long inlet-union screw 2 443 456 020).

## 20. Check fuel filter

Connect differential-pressure gauge to fuel filter using appropriate connecting pieces.

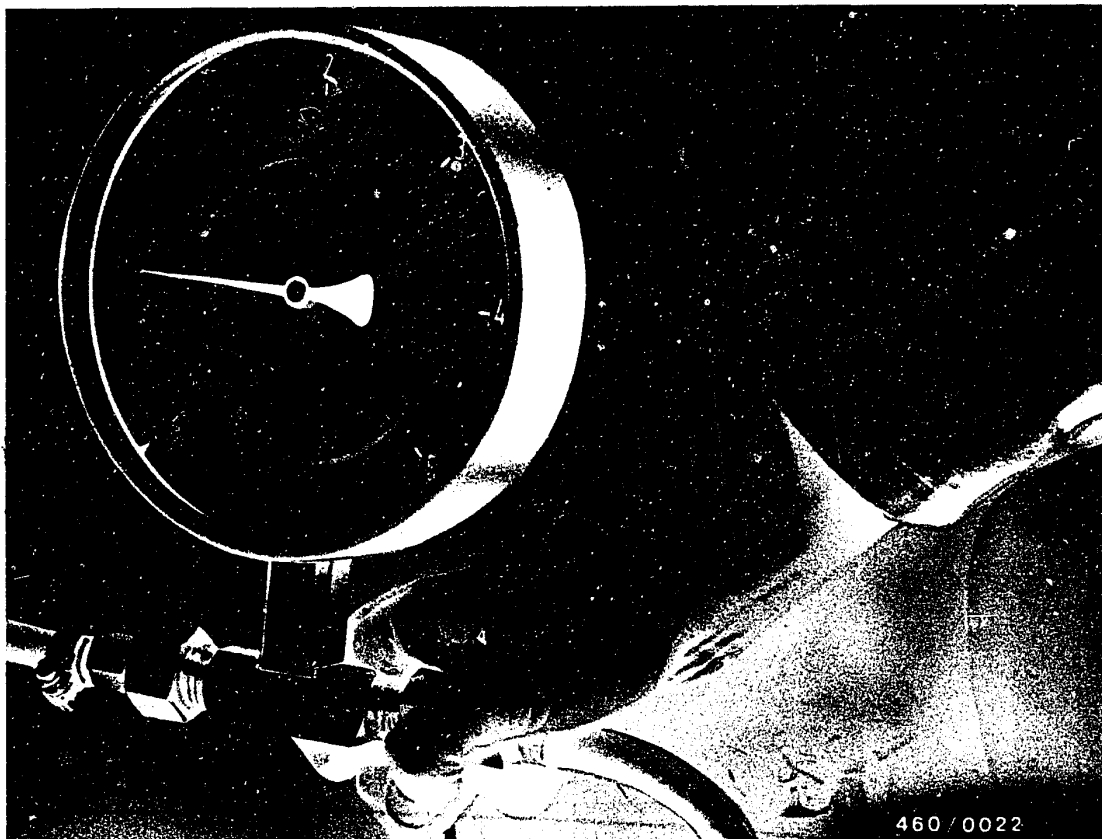
**C20**

Check fuel filter

Renault 18/20 D, 20/30 TD, Fuego TD







Connect the (+) side of the differential-pressure gauge to the fuel filter inlet. Fit the (-) connection of the pressure gauge to the filter outlet.  
See connection diagram.

Run engine until you are sure that there is no air in the fuel system.

**C21**

Check fuel filter

Renault 18/20 D, 20/30 TD, Fuego TD





## 20.1 Fuel system with pre-supply pump

### Measure pressure of supply pump:

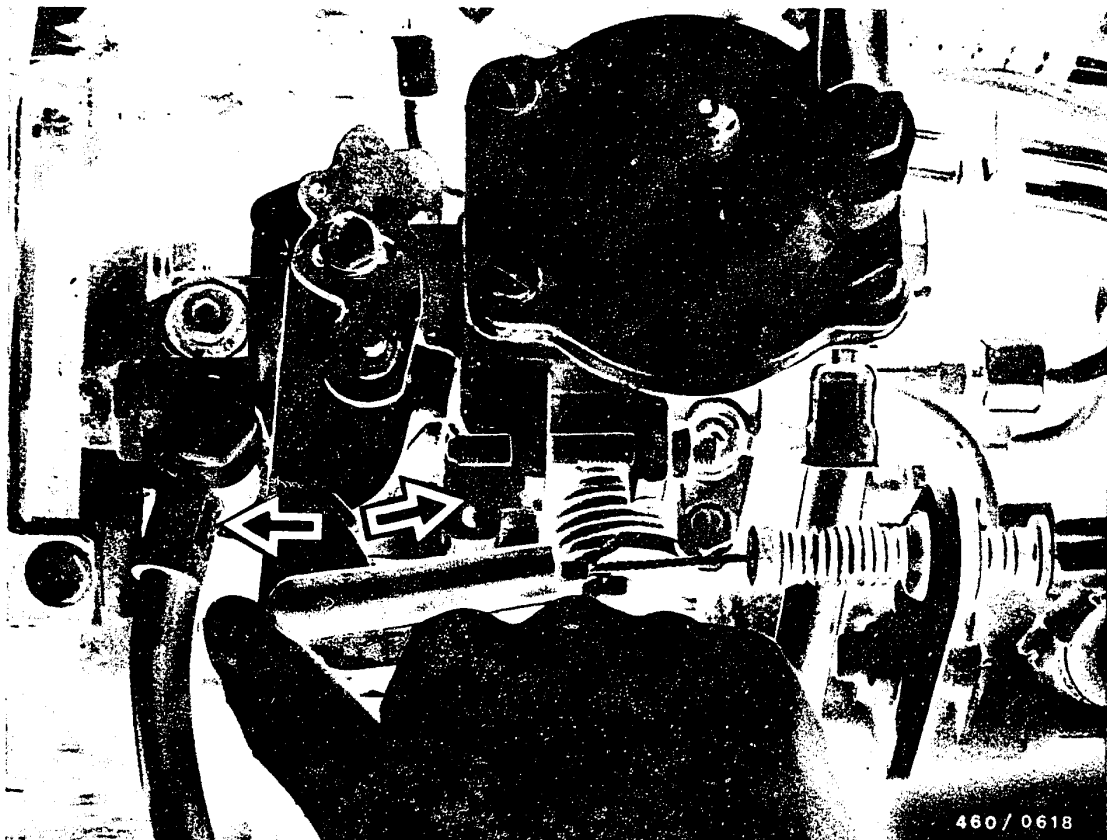
At idle:                      0.3 ... 0.45 bar  
at rated speed:            min. 0.15 bar

Read off these values on the black pointer.

At rated speed the differential pressure between fuel filter inlet and outlet (difference between white and black pointers) may be max. 0.12 bar.

If this value is exceeded, replace filter box.





## 20.2 Fuel system without fuel-supply pump

Move injection-pump control lever briskly (approx. 1 sec) from the idle stop to the maximum speed stop.

Release control lever and read off differential pressure on pressure gauge.

The differential pressure may be max. 0.3 bar. If this value is exceeded, replace filter. Remove test connections.

If necessary, bleed fuel system.



## 21. Check pre-heating system

### Necessary test equipment

Voltmeter/ammeter e.g. ETT 011.00 0 684 101 100

### Workshop information

We recommend that the "R"-type sheathed-element glow plugs be replaced every 45 000 km.

### Pre-heating times

The pre-heating time is dependent on the ambient temperature.

### Before testing, make sure of the following:

Battery fully charged.

Compression O.K.. If necessary, test compression loss.

Fuel supply/fuel-injection system O.K.



Starting motor operates, engine fails to start or starts only with great difficulty

Yes

Test power supply to R-type sheathed-element glow plugs.

Connect voltmeter to R-type sheathed-element glow plugs and to ground. Turn glow-plug and starter switch to position G and then to position M.

For at least 20 seconds (depends on temperature) a minimum voltage of 10 V must be indicated.

After this time the system switches off automatically.

Note:

If the measurement has to be repeated, turn the glow-plug and starter switch first to position G and then to position M.

Minimum voltage present?

Yes

Test start repeater lamp.

Turn glow-plug and starter switch to position G and then to position M.

Start repeater lamp must light up.

Start repeater lamp lit?

Yes

Continued on D 4 / D 5

No

1. If voltage below 10 V, test power circuit (battery +) as well as term. 5 and 3 of power relay for voltage drop. Eliminate voltage drop.

2. If no voltage, test leads from R-type sheathed-element glow plugs to power relay term. 3 for open circuit.

Eliminate open circuit.

If no open circuit, continue on D 8. Continuation from here not necessary.

No

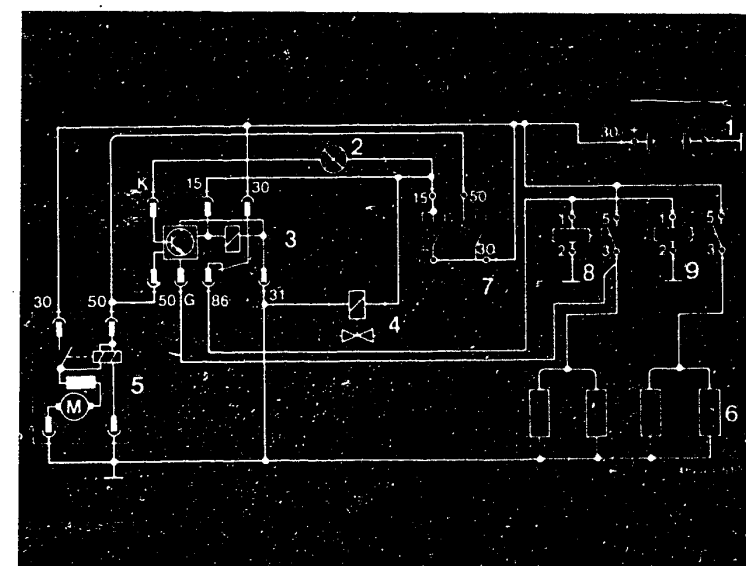
1. Test lead from glow-plug and starter switch term. 15 to glow-duration unit term. 15 and term. K including start repeater lamp for open circuit.

Eliminate open circuit.

2. Test ground lead term. 31 from glow-duration unit for open circuit. Eliminate open circuit.

3. Test lead from power relay term. 3 to glow-duration unit term. G for open circuit. Eliminate open circuit.

4. If points 1 to 3 O.K., then replace glow-duration unit.



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs
- 7 = Glow-plug and starter switch
- 8, 9 = Power relays

**D2**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



**D3**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



## Test pre-heating system (continued)

Yes

### Test pre-heating time

Turn glow-plug and starter switch to position G and then to position M. The pre-heating time (start repeater lamp lit) must be as follows for the following ambient temperatures:

|         | for glow-duration unit<br>0 333 402 001 | for<br>0 333 402 006 |
|---------|-----------------------------------------|----------------------|
| at 0° C | 14...22 sec.                            | approx. 10 sec.      |
| + 10° C | 11...19 sec.                            | approx. 8 sec.       |
| + 20° C | 8...15 sec.                             | approx. 6 sec.       |
| + 30° C | 5...11 sec.                             | approx. 5 sec.       |
| + 40° C | 2... 7 sec.                             | approx. 4 sec.       |

Pre-heating time (seconds) O.K.?

No

Replace glow-duration unit.

Yes

### Test safety circuit

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position G and then to position M. The voltmeter must indicate voltage for the following lengths of time at the following ambient temperatures:

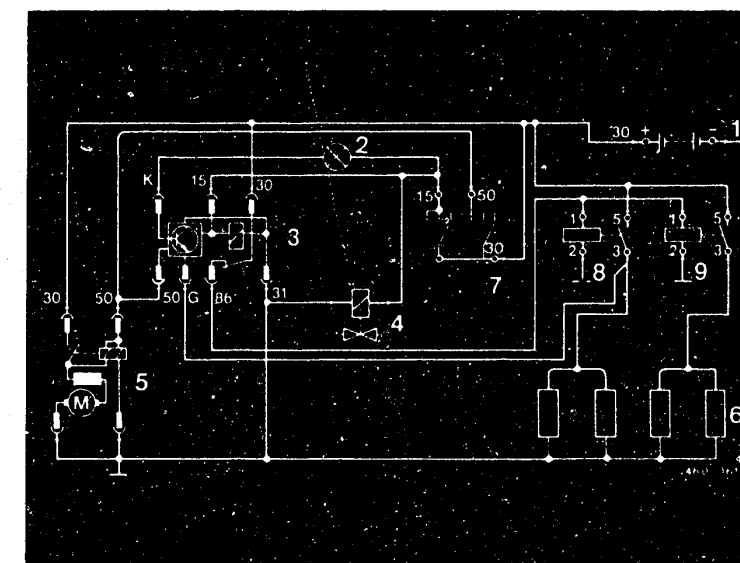
|         | for glow-duration unit<br>0 333 402 001 | for<br>0 333 402 006 |
|---------|-----------------------------------------|----------------------|
| at 0° C | for 34...52 sec.                        | 12...18 sec.         |
| + 10° C | for 31...49 sec.                        | 10...16 sec.         |
| + 20° C | for 28...45 sec.                        | 8...14 sec.          |
| + 30° C | for 25...41 sec.                        | 7...12 sec.          |
| + 40° C | for 22...37 sec.                        | 6...11 sec.          |

After the specified time the voltmeter must indicate 0 V. Does voltmeter return to 0 V after specified time?

No

Replace glow-duration unit.

Yes



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs
- 7 = Glow plug and starter switch
- 8 = Power relays
- 9 = Power relays

**D4**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



**D5**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



# Test pre-heating system (continued)

Yes

## Test pre-heating when operating starting motor.

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position D. Voltmeter must indicate a voltage of 6...10 V.

Voltage present?

No

1. Test lead from glow-plug and starter switch term. 50 to glow-duration unit term. 50 for open circuit. Eliminate open circuit.
2. If point 1 O.K., then replace glow-duration unit.

Yes

## Test R-type sheathed-element glow plugs

Test R-type glow plugs individually for continuity using ohmmeter.

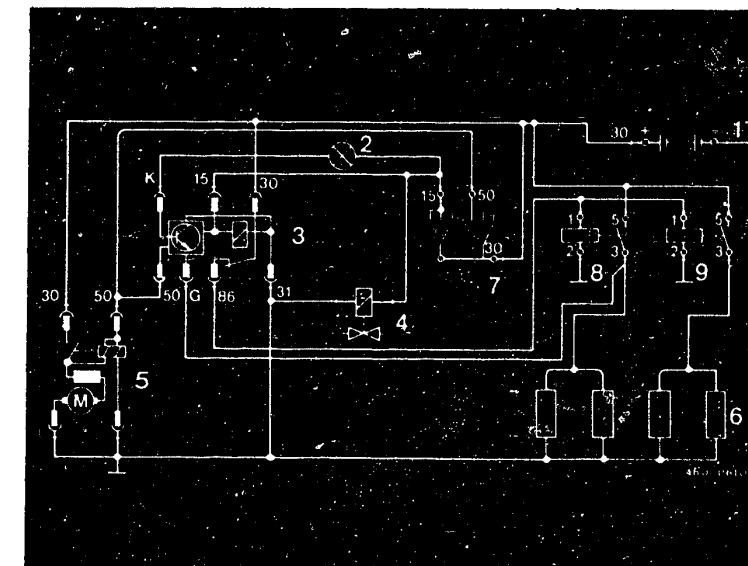
O.K.?

No

Replace R-type sheathed-element glow plug.

Yes

Pre-heating system O.K., tests as of D 8 not necessary.



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs
- 7 = Glow plug and starter switch
- 8, 9 = Power relays

**D6**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



**D7**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



# Test pre-heating system (continued from D2/D3)

## Test voltage at glow-duration unit term. 15.

Connect voltmeter to glow-duration unit term. 15 and to ground.  
Turn glow-plug and starter switch to position G and then to position M. The voltmeter must indicate battery voltage.

Battery voltage present?

Yes

## Test voltage at glow-duration unit term. 86.

Connect voltmeter to glow-duration unit term. 86 and to ground.  
Turn glow-plug and starter switch to position G and then to position M.  
The voltmeter must indicate approx. battery voltage (for a limited time).

Battery voltage present?

Yes

## Test voltage at both power relays term. 1.

Connect voltmeter to power relay term. 1 and to ground.  
Turn glow-plug and starter switch to position G and then to position M. The voltmeter must indicate approx. battery voltage (for a limited time).

Battery voltage present?

Yes

Continued on D 10/D 11

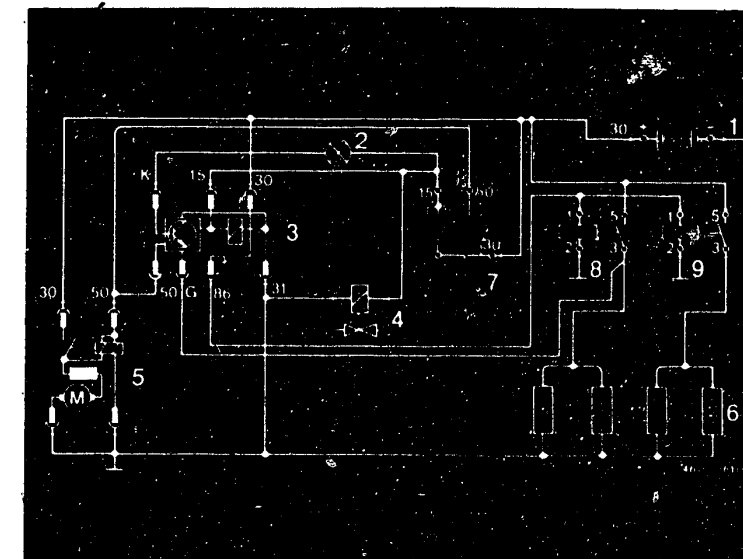
Test leads from positive battery terminal through glow-plug and starter switch to glow-duration unit term. 15 for open circuit.

Eliminate open circuit.

Replace glow-duration unit.

Test lead from glow-duration unit term. 86 to power relay term. 1 for open circuit.

Eliminate open circuit.



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs
- 7 = Glow plug and starter switch
- 8, 9 = Power relays

D8

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



D9

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD





# Test pre-heating system (continued)

Yes

## Test winding and ground lead of both power relays.

Connect ohmmeter to power relay term. 1 and to ground.

Resistance approx. 18  $\Omega$ .

Resistance O.K.?

No

1. Test ground lead of power relay term. 2 for open circuit.

Eliminate open circuit.

2. If no open circuit, then replace power relay.

Yes

## Test power relays.

Connect voltmeter to both power relays term. 5 and ground.

The voltmeter must indicate battery voltage. Battery voltage present?

No

Test lead from positive battery terminal to power relay term. 5 for open circuit.

Eliminate open circuit.

Yes

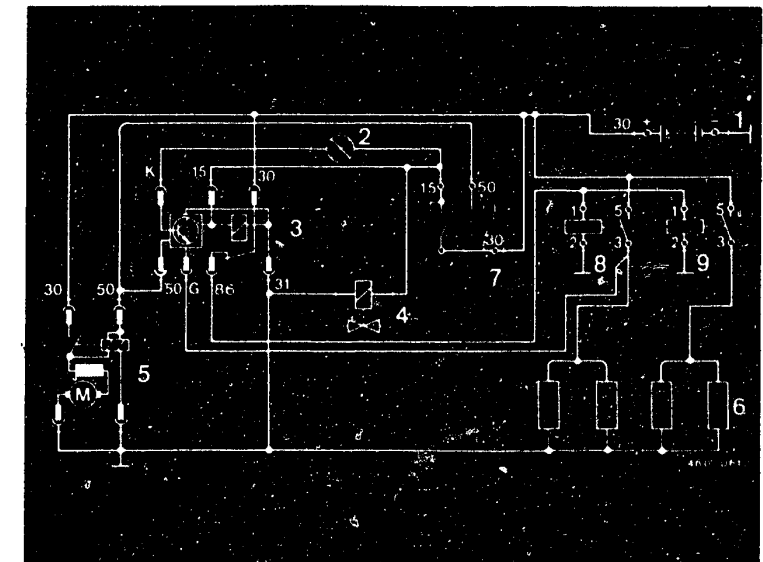
Voltage now present at R-type sheathed-element glow plugs?

No

Replace power relay.

Yes

Continued on D 12/D 13



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs
- 7 = Glow plug and starter switch
- 8, 9 = Power relays

**D 10**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



**D 11**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



# Test pre-heating system (continued)

Yes

## Test start repeater lamp.

Turn glow-plug and starter switch to position G and then to position M.  
Start repeater lamp must light up.

Start repeater lamp lit?

Yes

## Test pre-heating time

Turn glow-plug and starter switch to position G and then to position M. The pre-heating time (start repeater lamp lit) must be as follows for the following ambient temperatures:

|         | for glow-duration unit<br>0 333 402 001 | for<br>0 333 402 006 |
|---------|-----------------------------------------|----------------------|
| at 0° C | 14...22 sec.                            | approx. 10 sec.      |
| + 10° C | 11...19 sec.                            | approx. 8 sec.       |
| + 20° C | 8...15 sec.                             | approx. 6 sec.       |
| + 30° C | 5...11 sec.                             | approx. 5 sec.       |
| + 40° C | 2... 7 sec.                             | approx. 4 sec.       |

Pre-heating time (seconds) O.K.?

Yes

Continued on D14/D15

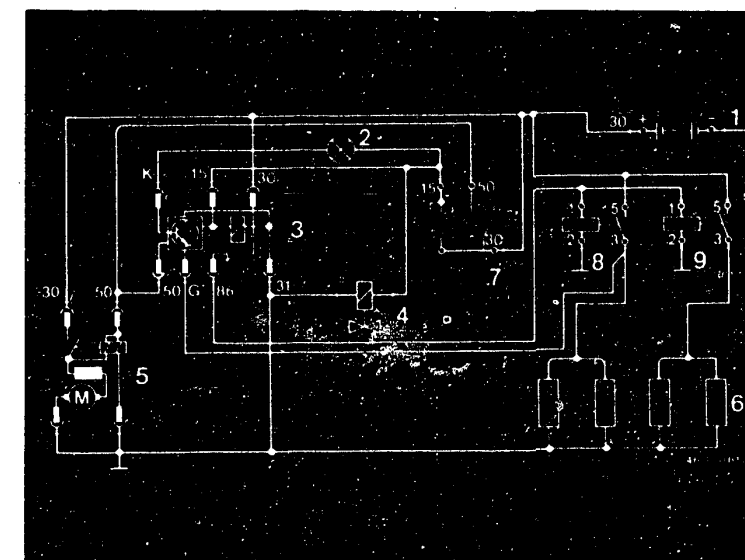
No

1. Test lead from glow-plug and starter switch term. 15 to glow-duration unit term. 15 and term. K including start repeater lamp for open circuit. Eliminate open circuit.
2. Test ground lead term. 31 from glow-duration unit for open circuit. Eliminate open circuit.
3. Test lead from power relay term. 3 to glow-duration unit term. G for open circuit. Eliminate open circuit.
4. If points 1 to 3 O.K., then replace glow-duration unit.

No

Replace glow-duration unit.

- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs
- 7 = Glow plug and starter switch
- 8, 9 = Power relays



D12

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



D13

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD



## Test pre-heating system (continued)

Yes

### Test safety circuit

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position G and then to position M. The voltmeter must indicate voltage for the following lengths of time at the following ambient temperatures:

| for glow-duration unit   | for           |
|--------------------------|---------------|
| 0 333 402 001            | 0 333 402 006 |
| at 0° C for 34...52 sec. | 12...18 sec.  |
| + 10° C for 31...49 sec. | 10...16 sec.  |
| + 20° C for 28...45 sec. | 8...14 sec.   |
| + 30° C for 25...41 sec. | 7...12 sec.   |
| + 40° C for 22...37 sec. | 6...11 sec.   |

After the specified time the voltmeter must indicate 0. V. Does voltmeter return to 0 V after specified time?

No

Replace glow-duration unit.

Yes

### Test pre-heating when operating starting motor

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position D. Voltmeter must indicate a voltage of 6...10 V. Voltage present?

No

1. Test lead from glow-plug and starter switch term. 50 to glow-duration unit term. 50 for open circuit. Eliminate open circuit.  
2. If point 1 O.K., then replace glow-duration unit.

Yes

### Test R-type sheathed-element glow plugs

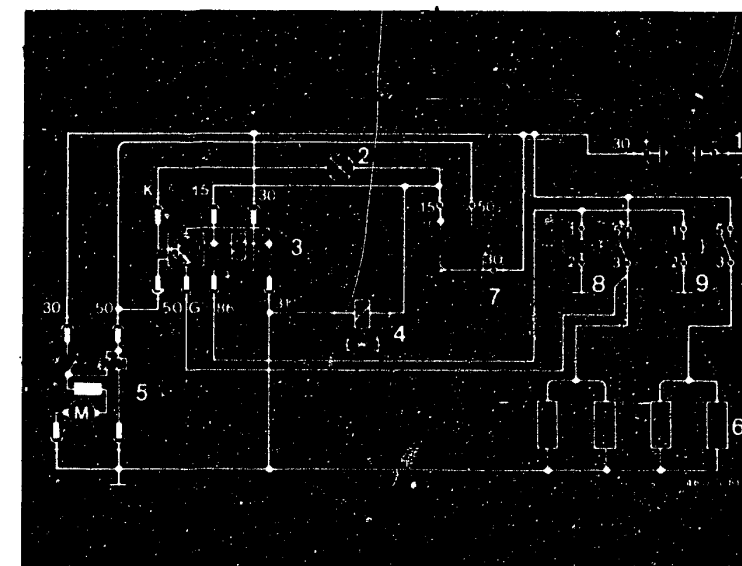
Test R-type glow plugs individually for continuity using ohmmeter. O.K.?

No

Replace R-type sheathed-element glow plug.

Yes

Pre-heating system O.K.



- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V, 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor
- 6 = Sheathed-element glow plugs
- 7 = Glow plug and starter switch
- 8, 9 = Power relays

**D14**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD

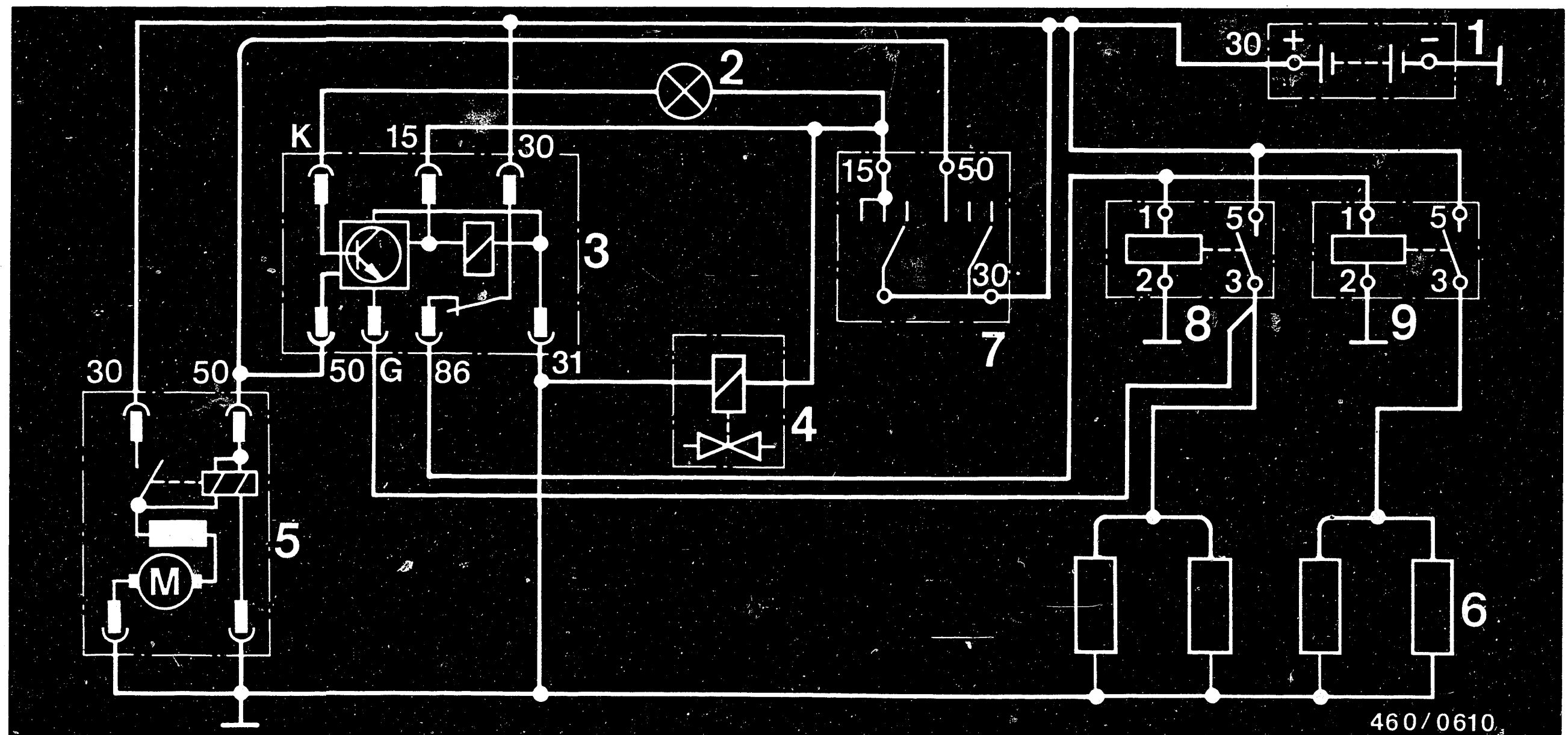


**D15**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD





- 1 = Battery
- 2 = Glow-plug indicator lamp (12 V 2 W)
- 3 = Glow-duration unit
- 4 = Solenoid-operated valve
- 5 = Starting motor

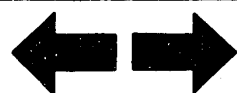
- 6 = Sheathed-element glow plugs
- 7 = Glow-plug and starter switch
- 8 = Power relay
- 9 = Power relay

3. Terminal diagram of pre-heating system in Renault 18D, 20D, 20TD, 30TD, Fuego TD

**D16**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD

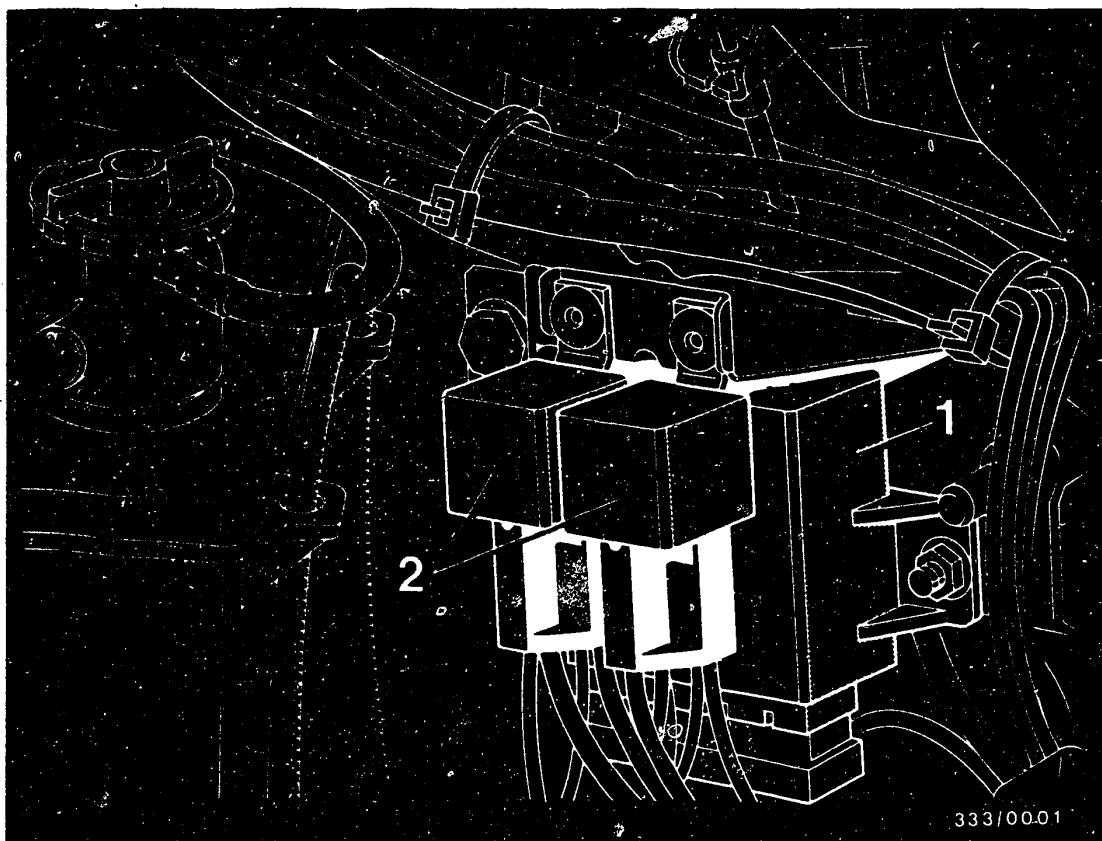


**D17**

Test pre-heating system

Renault 18/20 D, 20/30 TD, Fuego TD





1 = Glow-duration unit      2 = Power relays

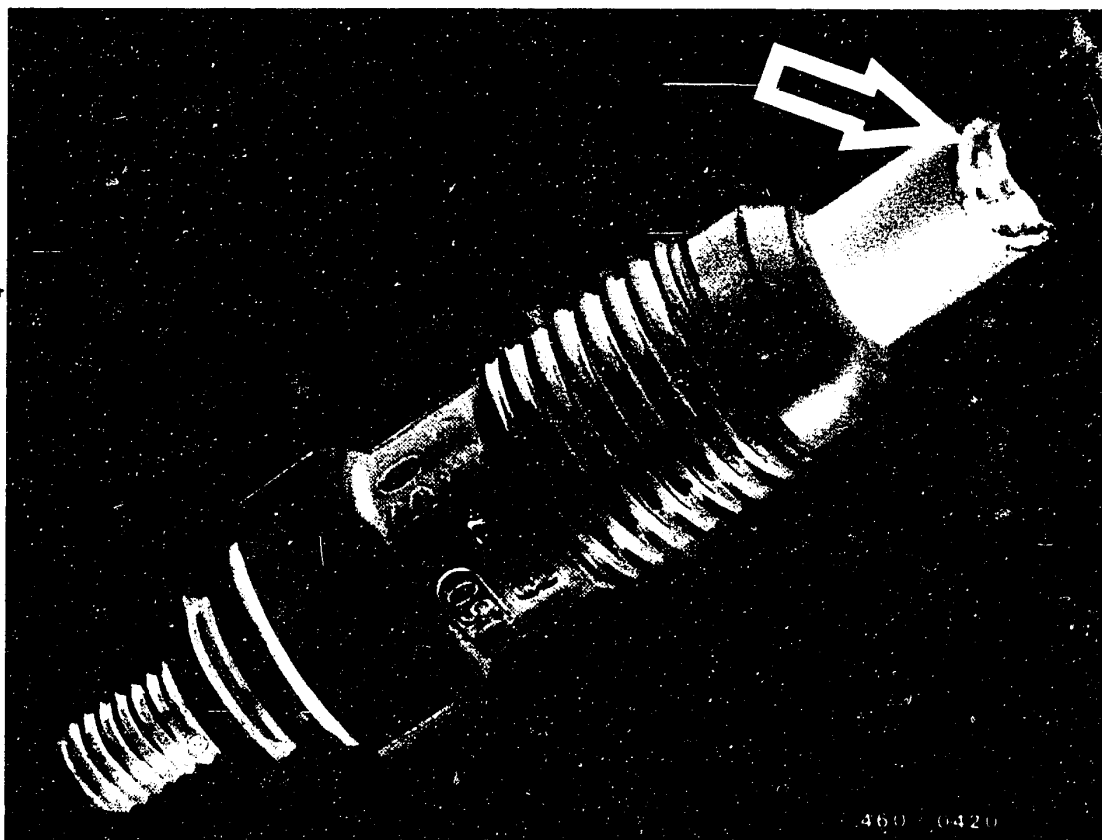
21.2 Installation position of components of pre-heating system

**D18**

Test pre-heating system

Renault 13/20 D, 20/30 TD, Fuego TD





Note:

Glow plugs with burned elements

Glow plugs with burned elements are frequently the result of troubles with the injection nozzle.

If glow plugs are found to have burned elements (arrow), it is not sufficient simply to replace them. The injection nozzles must also be tested for spray pattern, chattering, pressure and leaks.



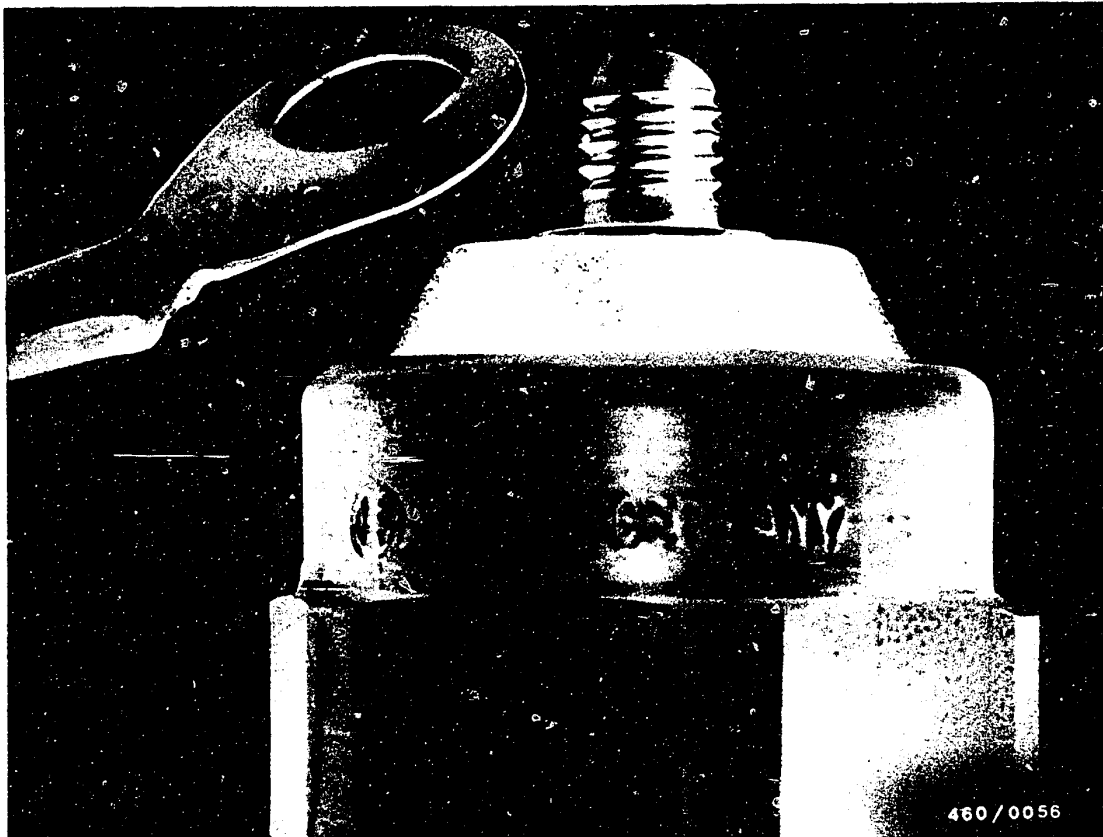
## 22. Check timing device

In distributor-type fuel-injection pumps VE..F.. the timing device is integral with the fuel-injection pump.

In order to test the timing device, it is necessary to remove the fuel-injection pump.

Perform the test on the injection-pump test bench.





## 23. Measure engine compression and compression loss

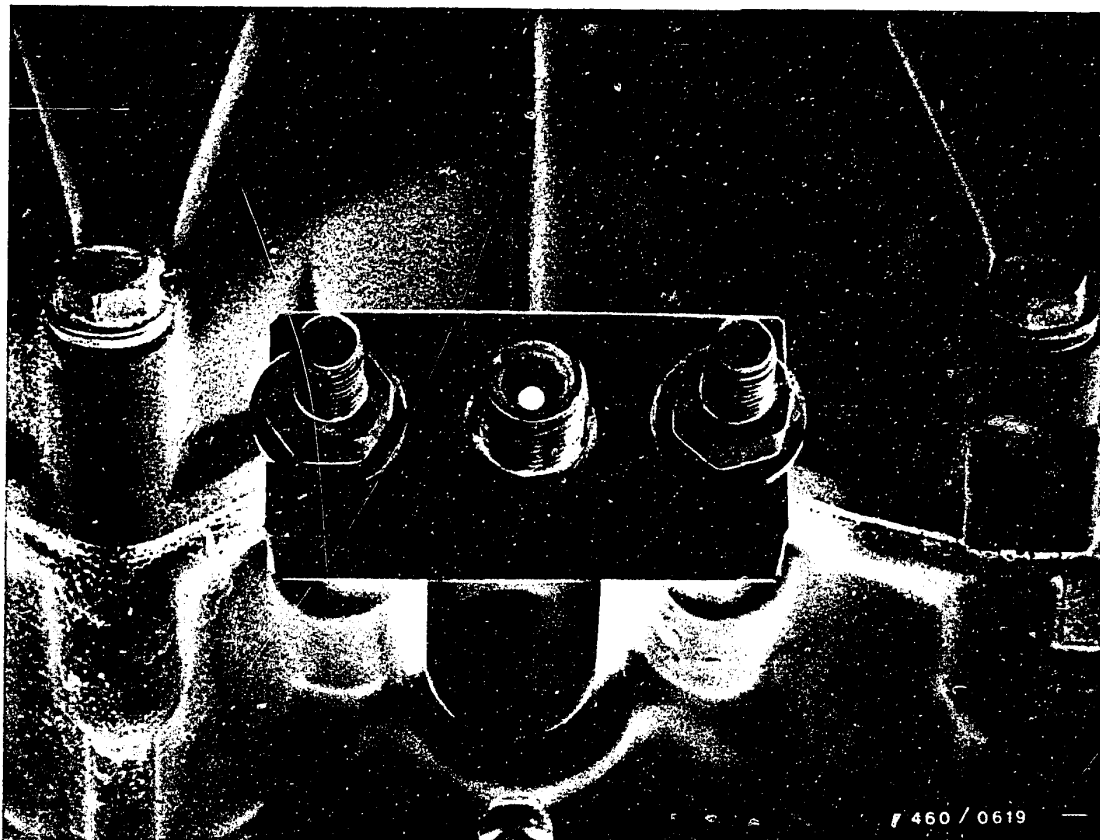
### 23.1 Measure engine compression

Fit new chart in compression tracer. Mount high-pressure hose on tracer. Switch off engine.

In order to prevent fuel from being injected, remove connecting cable from shutoff magnet on distributor-type fuel-injection pump (picture).







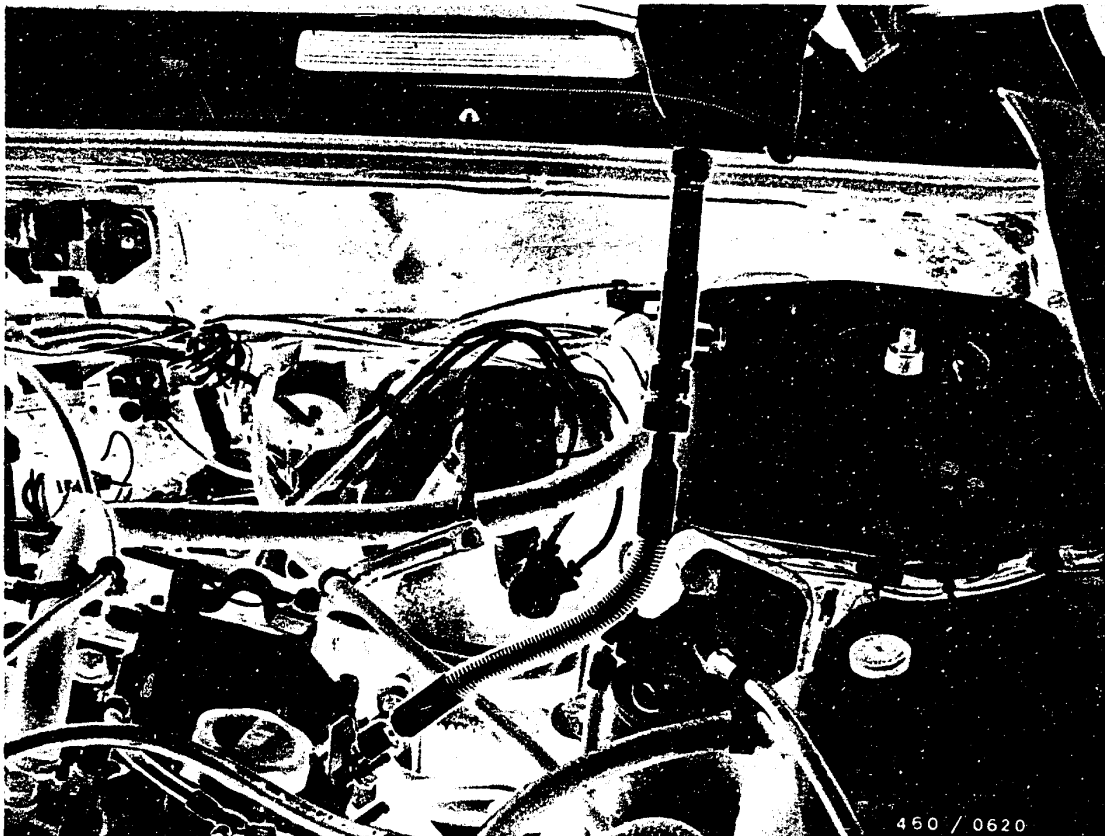
Screw out nozzle holder and use suitable connection nipple for compression tester.

With the aid of the starting motor, turn the engine over several times so that loose residues are removed from the compression space.

Screw in connection nipple.  
(Ensure good sealing when screwing into the bore of the nozzle holder).

Mount high-pressure hose of compression tester on connection nipple.





During the following operation, note first compression stroke in particular.

Operate starting motor until there is no longer any detectable rise in pressure on the compression tracer.

Bleed compression tracer by pressing on bleeder valve.

The pointer returns to the starting position.

Move chart onto next position.

Fit connection nipple to the other cylinders and repeat measurement.

Compression pressure:                      20 ... 30 bar



## 23.1.1 Evaluation of chart

### 1. Normal pressure rise

If piston rings and valves are in good condition, the first compression stroke shows the highest pressure increase.

During the following compression strokes the compression builds up to the maximum pressure.

### 2. Gradual pressure rise

If, from the start, the compression increases only gradually on each piston stroke, this points to burnt valve seats or defective valve guides.

### 3. Low maximum pressure

If the maximum pressure obtained is too low on all cylinders, this points to defective pistons, piston rings or valves.

If the compression is too low on two neighbouring cylinders, this points to a leaky cylinder head gasket.



#### 4. Varying compression

If one cylinder shows a clearly lower compression, proceed as follows: fill in 2-3 cm<sup>3</sup> of engine oil through the opening of the sheathed-element glow plug or nozzle-holder assembly and operate starting motor briefly.

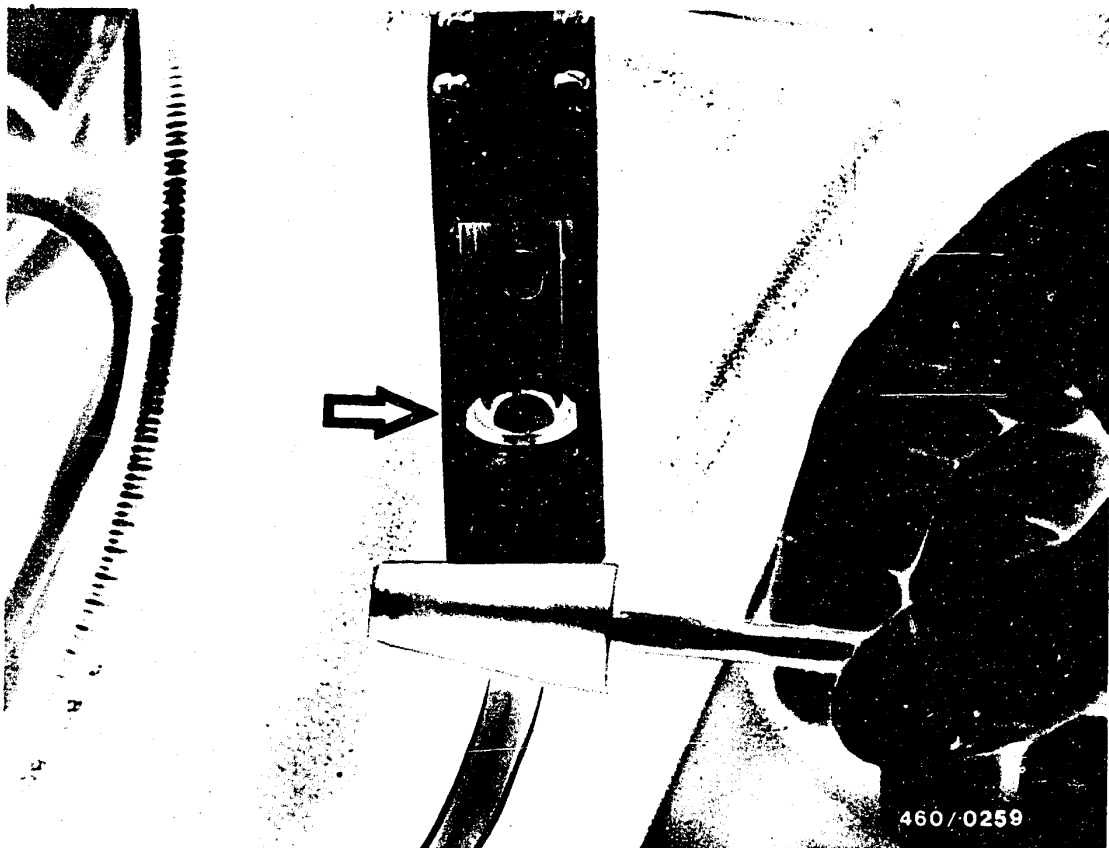
Repeat measurements and compare charts. If there is a clear increase in compression during the second test, then the piston rings or cylinders are worn.

If there is no change in the result, then defective valves are the cause.

#### 5. Uniform compression

Uniform compression is extremely important with regard to the smooth running of the engine. Maximum compression is, therefore, not the only objective.





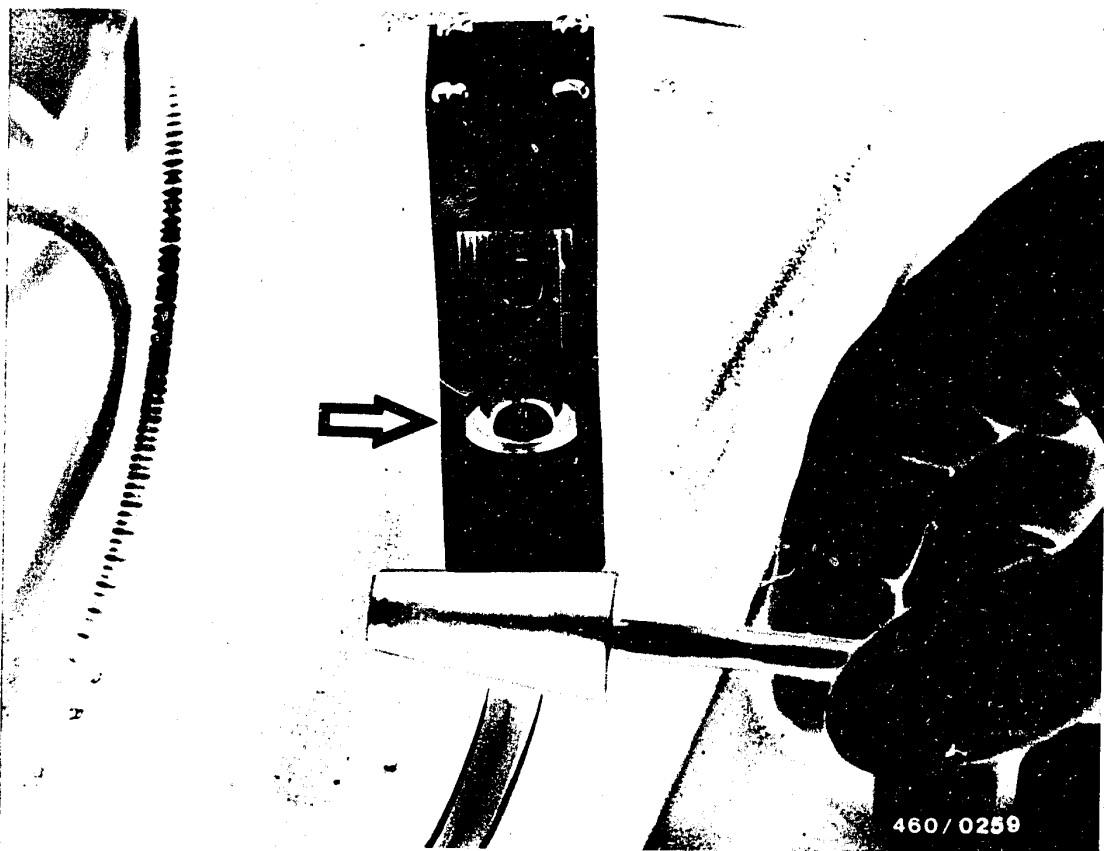
### 23.2 Measure compression loss of engine

The test is performed using the Bosch compression-loss tester 0 681 001 901 (EFAW 210 A).

For testing, the respective piston must be at TDC (TDC = top dead centre) on the compression stroke.

For setting this position, use DC detector 1 688 132 025 (included in accessories with compression-loss tester).

Perform test with engine at normal operating temperature (temperature of water approx. 80 °C).



### 23.2.1 Set top dead centre

Remove sheathed-element glow plug from cylinder 1.

Insert rubber plug of DC detector into bore for sheathed-element glow plug.

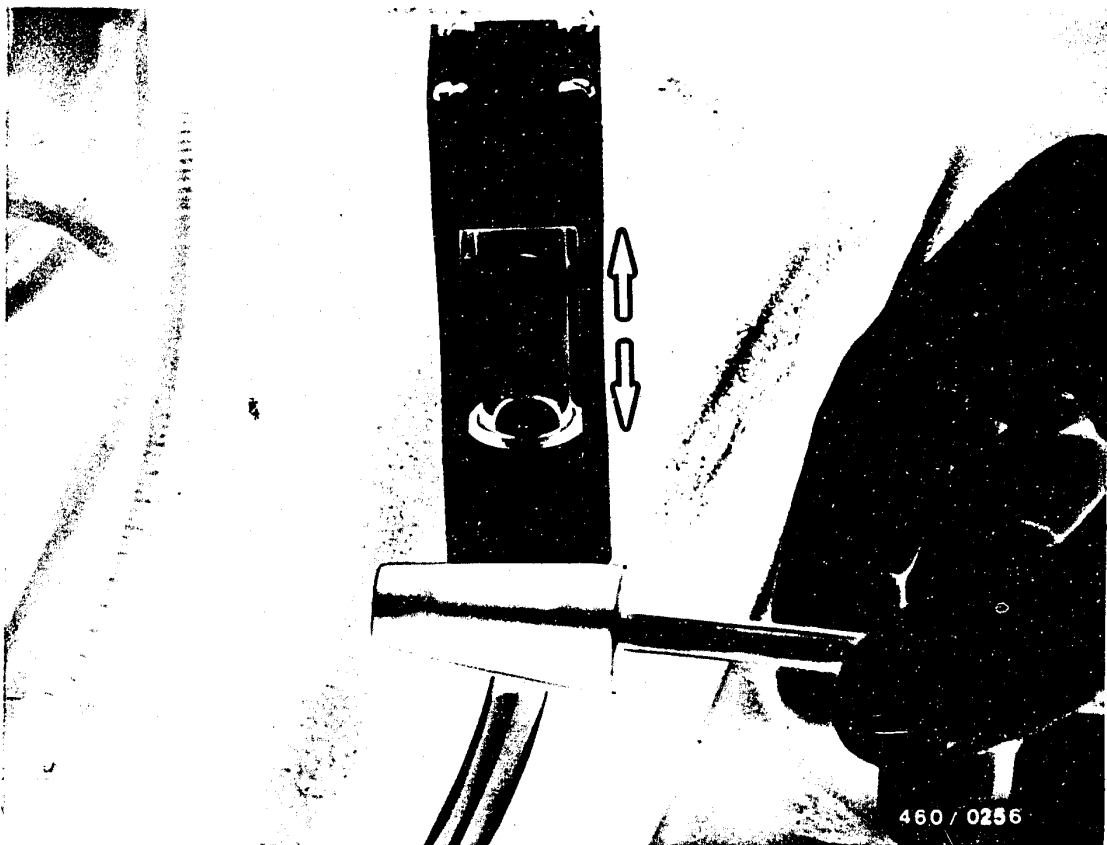
Using magnetic clamp, mount glass cylinder in as vertical a position as possible in the engine compartment. The piston of the unit must be easily visible.

Slowly turn the engine over by hand in its direction of rotation. (If necessary, select gear and push vehicle).

**E3**

Measure engine comp. and comp. loss  
Renault 18/20 D, 20/30 TD, Fuego TD





On the compression stroke, the piston of the DC detector is forced upwards.

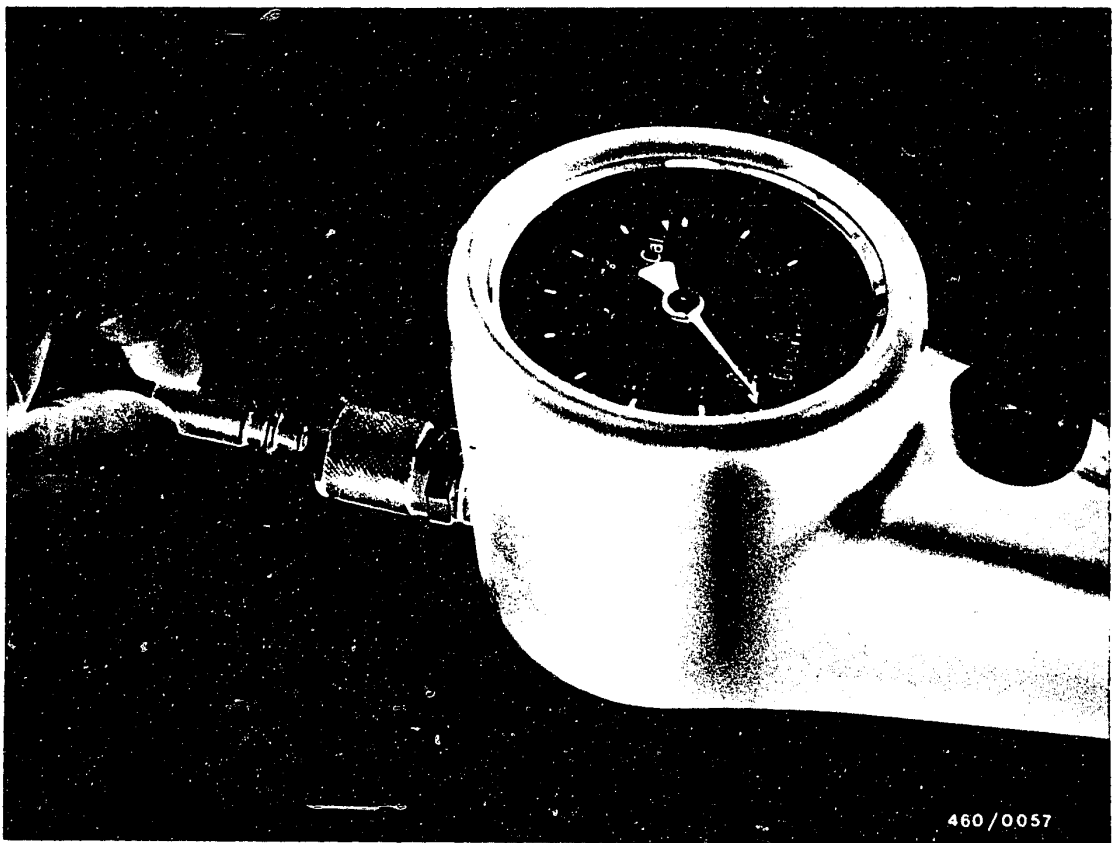
As top dead centre is passed over, the piston slides down again immediately.

Locate top dead centre by carefully turning the engine backwards and forwards.

**E4**

Measure engine comp. and comp. loss  
Renault 18/20 D, 20/30 TD, Fuego TD





### 23.2.2 Measure compression loss

Connect tester to compressed-air mains.

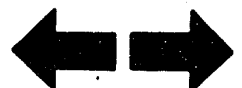
Connect calibrating nozzle 1 680 363 036. Set a compression loss of  $23 \pm 1\%$  (marking "Cal".) at the knurled thumbscrew on the pressure-regulating valve. Disconnect calibrating nozzle.

(Instrument indicator must show approximately 0% compression loss - equipment check.)

**E5**

Measure engine comp. and comp. loss

Renault 18/20 D, 20/30 TD, Fuego TD







Screw in fitting and mount test hose.  
Select gear and pull on handbrake.  
Connect test hose to tester.  
Read off compression loss in % on instrument.

Note:

Before testing the next cylinder, turn the engine over briefly without pre-heating using the starting motor so that the oil film re-forms.

**E6**

Measure engine comp. and comp. loss  
Renalut 18/20 D, 20/30 TD, Fuego TD



### 23.2.3 Evaluation of test

The compression loss indicated should not exceed 25%.

Differences of 10% between the individual cylinders can be ignored.

The causes of greater losses can be located because the air makes a noise as it escapes.

Listen at the following points:

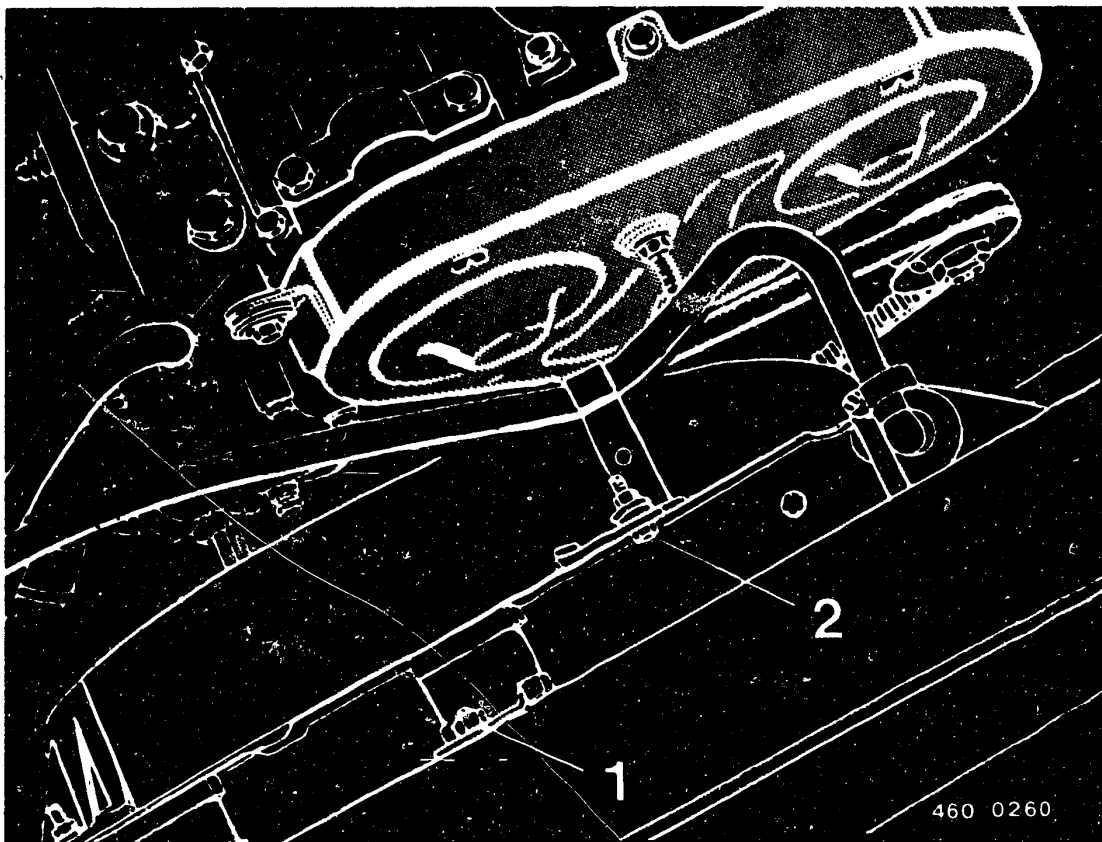
| <u>Location of noise</u>                   | <u>Possible trouble</u> |
|--------------------------------------------|-------------------------|
| Intake manifold<br>(remove air filter)     | Intake valve            |
| Exhaust manifold                           | Exhaust valve           |
| Oil filler neck on engine                  | Pistons, piston rings   |
| Cooling water filler neck<br>(air bubbles) | Cylinder head gasket    |

In order to trace the trouble even more accurately, fill approximately 2-3 cm<sup>3</sup> of engine oil into the cylinder. Repeat test.

If there is a clear decrease in compression loss during this test, then the fault lies with the piston or with the piston rings.

New engines which have not yet been run in (less than 5,000 km) may show higher compression losses than after the running-in period.





#### 24. Remove fuel-injection pump

The following operations do not apply to  
Renault 18 D

Disconnect negative cable from battery.

Remove upper fastening screws (1) of radiator.

Unscrew fastening screws (2) and nuts of air guide.

Tilt radiator and remove air guide.

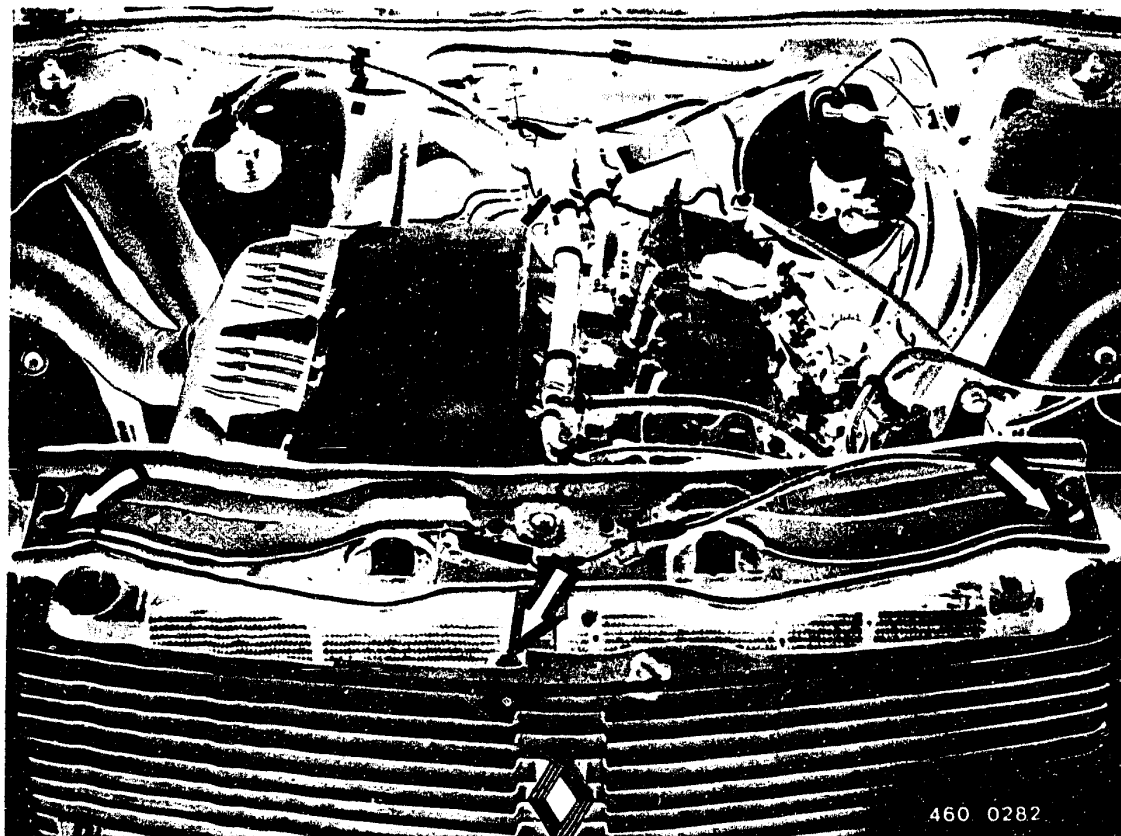
Loosen generator fastening screws and remove V-belt.

**E8**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





The following operations apply only to  
Renault 18 D

Disconnect negative cable from battery.

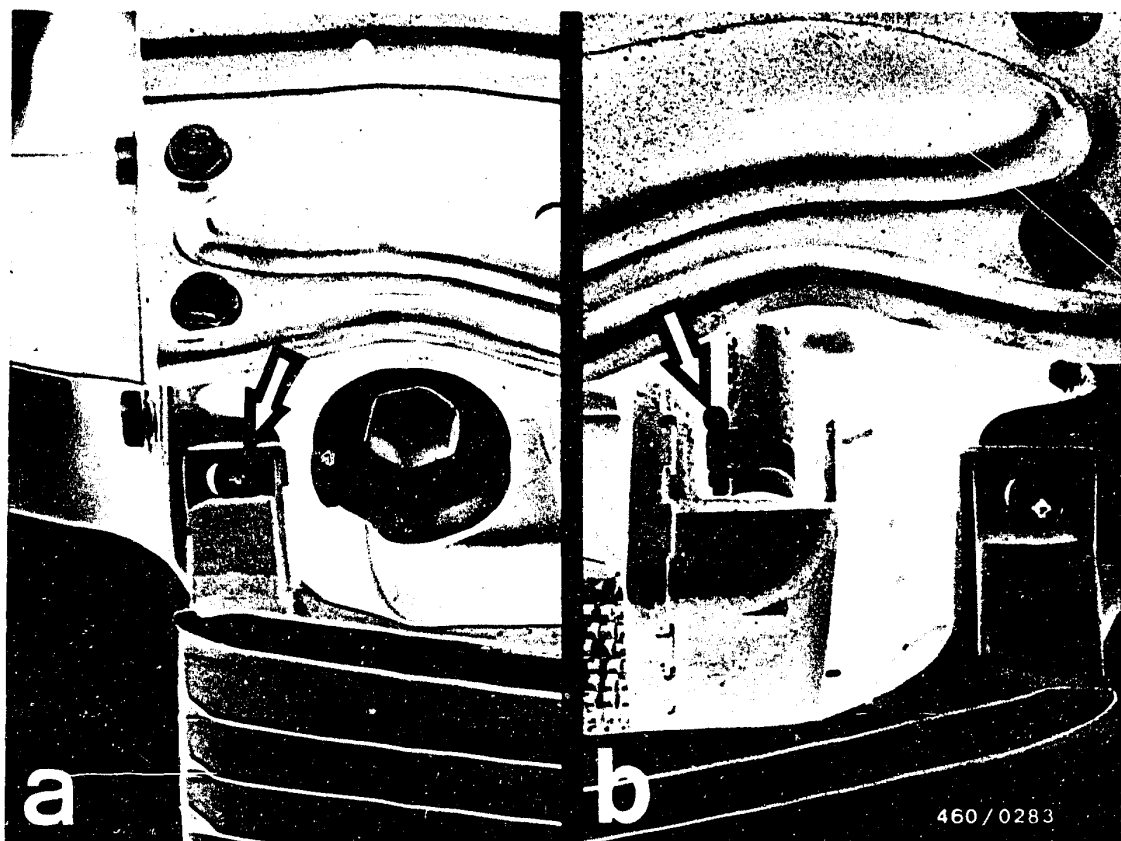
Unscrew lock carrier plate fastening screws (see arrows,  
picture).

Remove lock carrier plate.

**E9**

Remove fuel-injection pump  
Renault 18/20 D, 20/30 TD, Fuego TD





Remove radiator grille fastening screws (arrow, Fig. a) and remove radiator grille.

Pinch off overflow hose on radiator (arrow, Fig. b) by means of hose clammer and pull off radiator.

Seal off fitting on radiator with plastic cap.

Raise radiator and tilt to the left slightly out of the engine compartment.

Support radiator from below.

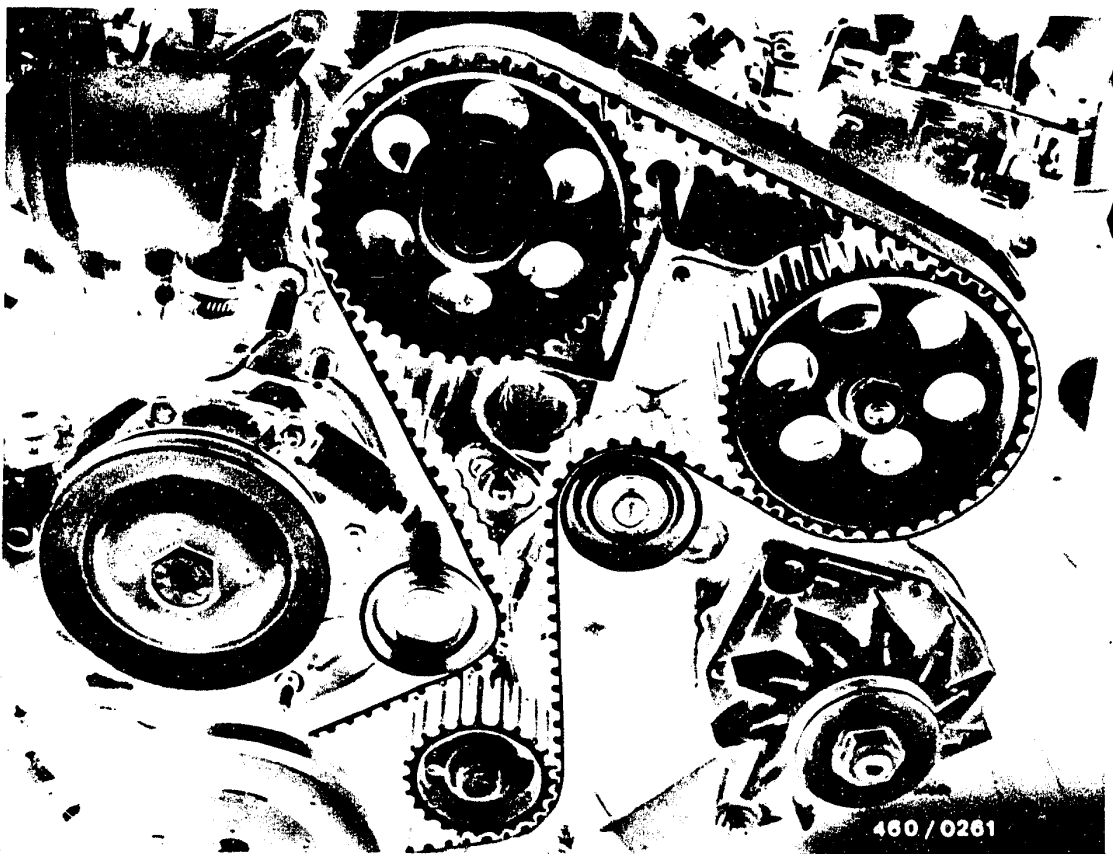
Loosen generator fastening screws and remove V-belt.

**E10**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





The following operations apply to a 11 vehicle models

Remove timing case fastening screws.

During the following operation, it may be necessary to operate the radiator fan wheel.

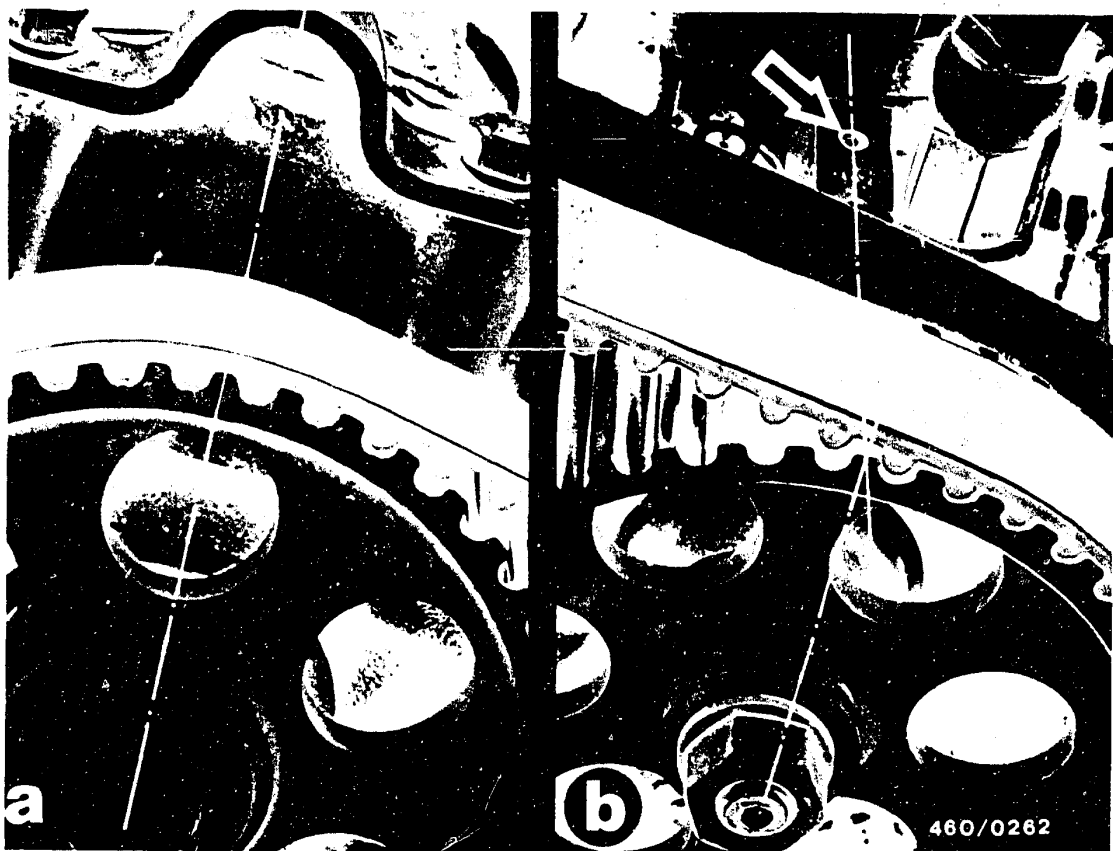
Remove timing case from engine.

**E11**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





Set engine to TDC on cylinder 1.

In this position, the mark on the camshaft gear aligns with the centre line of the valve cover (Fig. a).

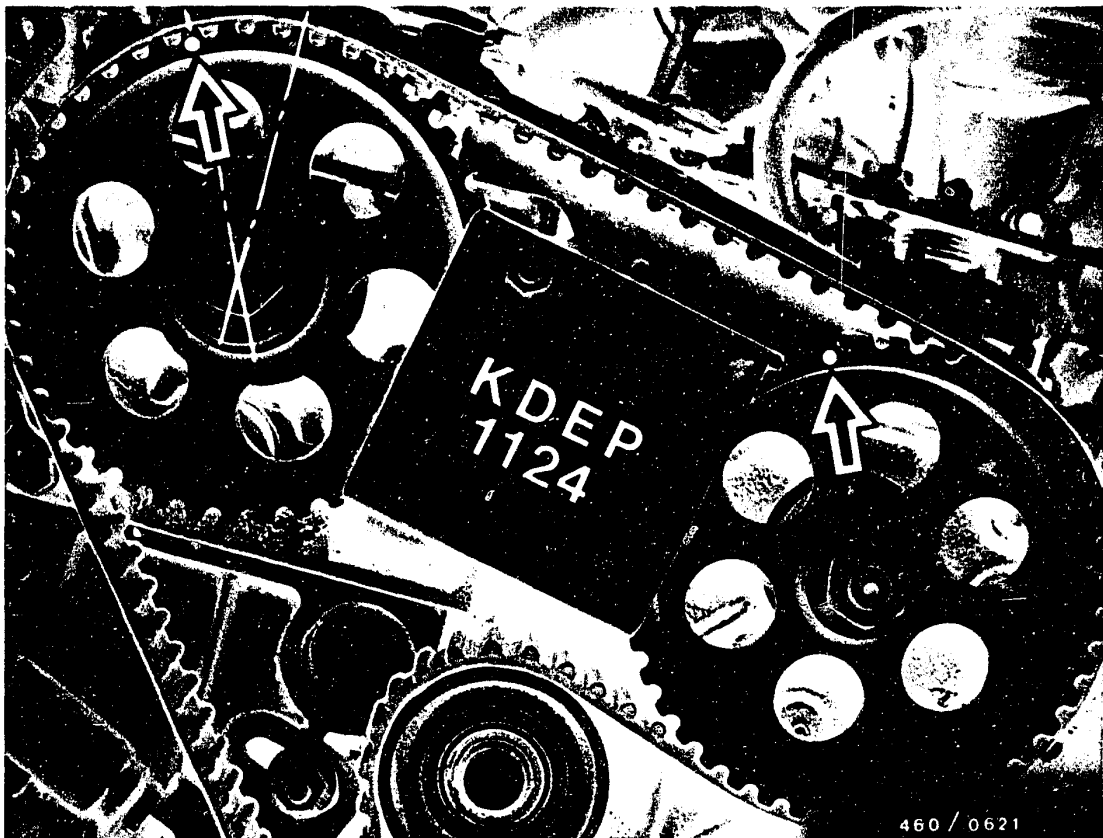
Mark on pump drive gear therefore points to the centre line of the governor shaft bore (Fig. b).

**E12**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





Turn back crankshaft until the mark on the camshaft gear is three teeth before TDC mark on valve cover.

Insert holding device KDEP 1124 between camshaft gear and pump drive gear and secure.

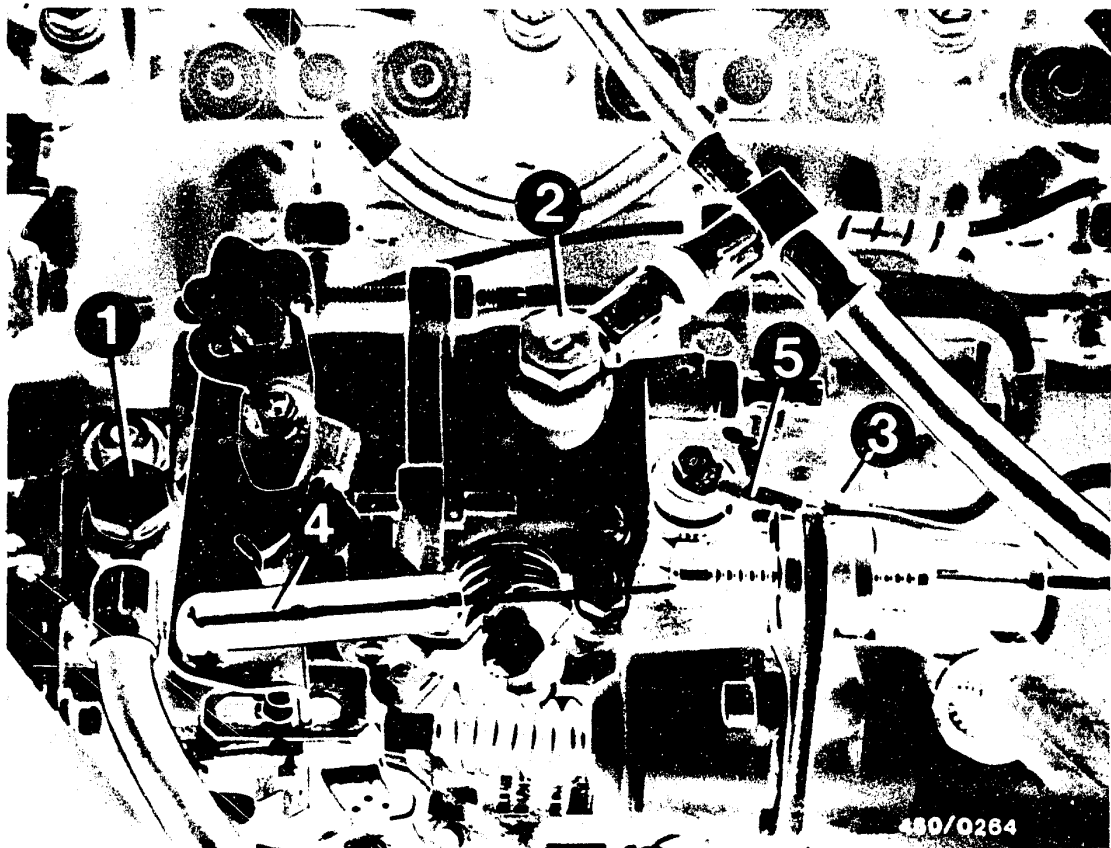
**E13**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD







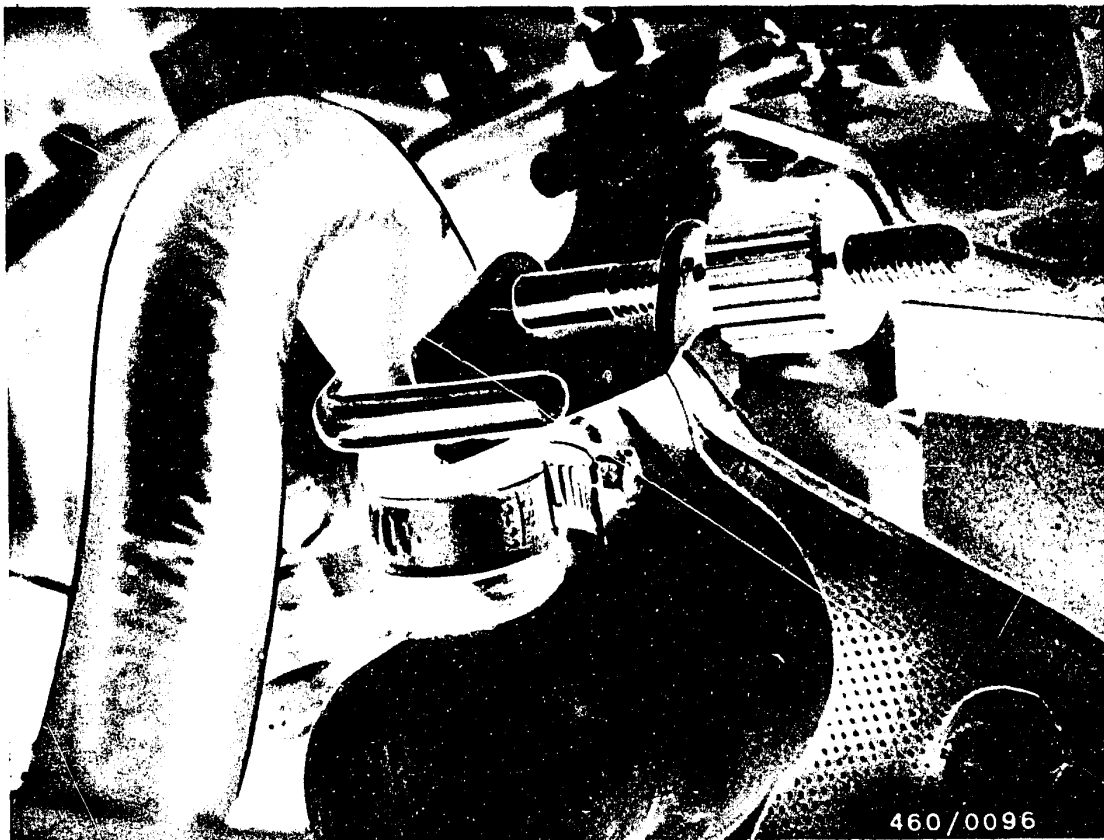
Remove fuel inlet line (1) and fuel return line (2) from fuel-injection pump.

Remove injection lines (3).  
(Prevent delivery-valve holders from coming loose by holding with a wrench).

Unhook accelerator cable (4) on injection-pump control lever and remove from holding bracket.

Remove electric lead (5) from injection-pump solenoid-operated valve.





Pinch off coolant hoses just after control device of injection pump using commercially available hose clampers.

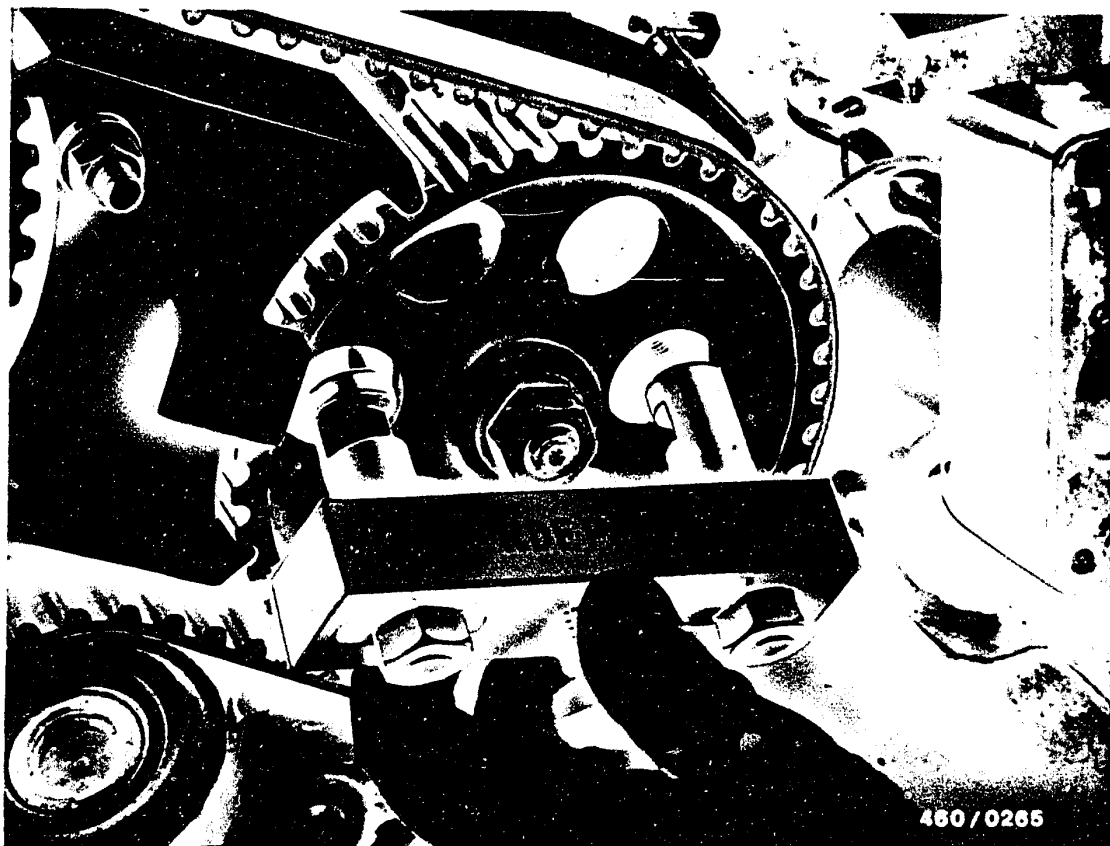
Loosen hose clips and pull off coolant hoses.

**E15**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





Loosen injection-pump gear fastening nut and unscrew by approx. 2 turns.

Pull off injection-pump gear using puller KDEP 1118 (picture).

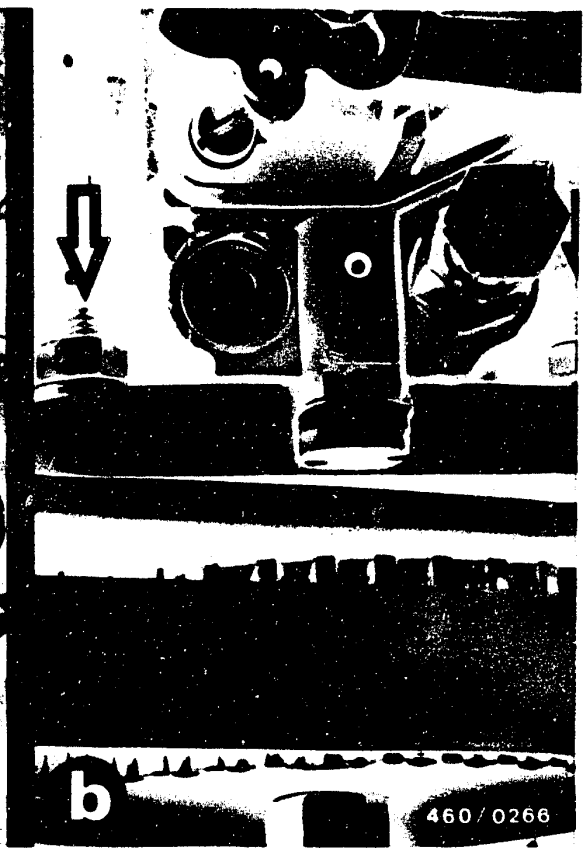
Remove fastening screw and plain washer from injection-pump drive shaft.

**E16**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





Unscrew injection pump support bracket fastening screws (on hydraulic head) (arrows, Fig. a).

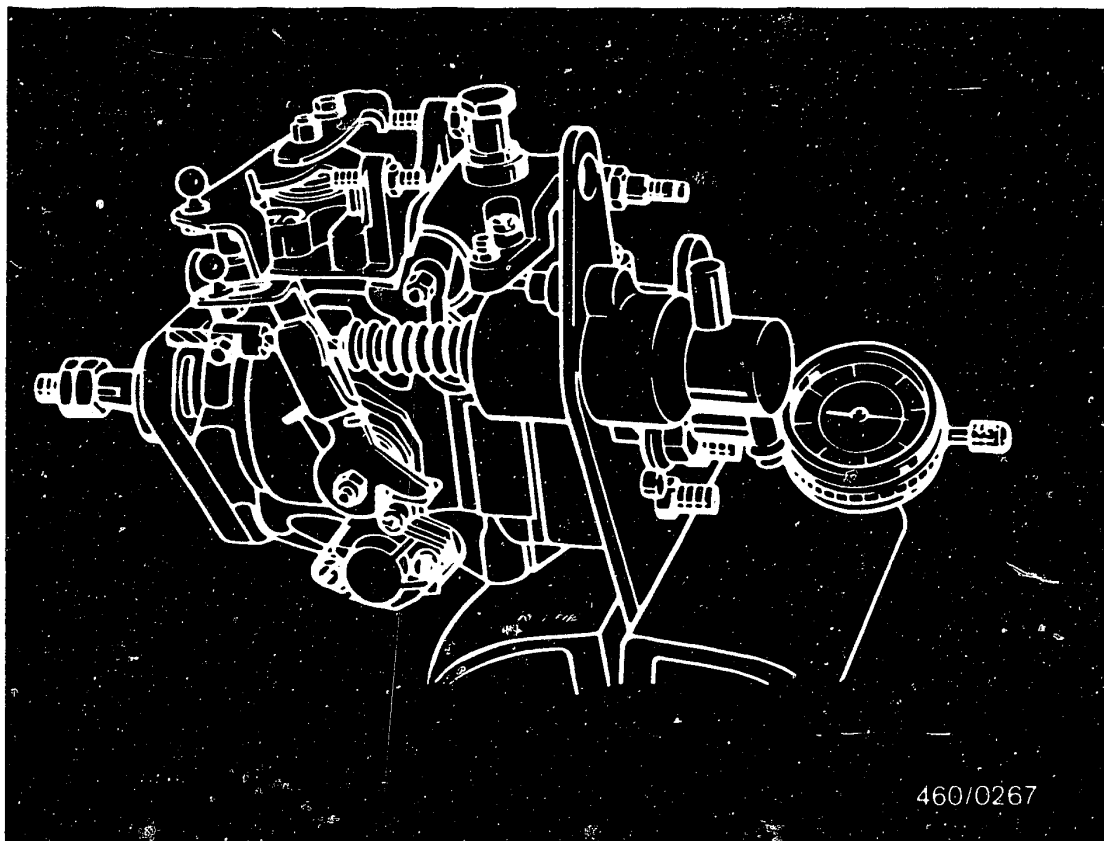
Remove injection-pump fastening nuts on pump flange and remove injection pump (arrow, Fig. b).

**E17**

Remove fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





## 25. Install fuel-injection pump

Clamp fuel-injection pump in a vice.

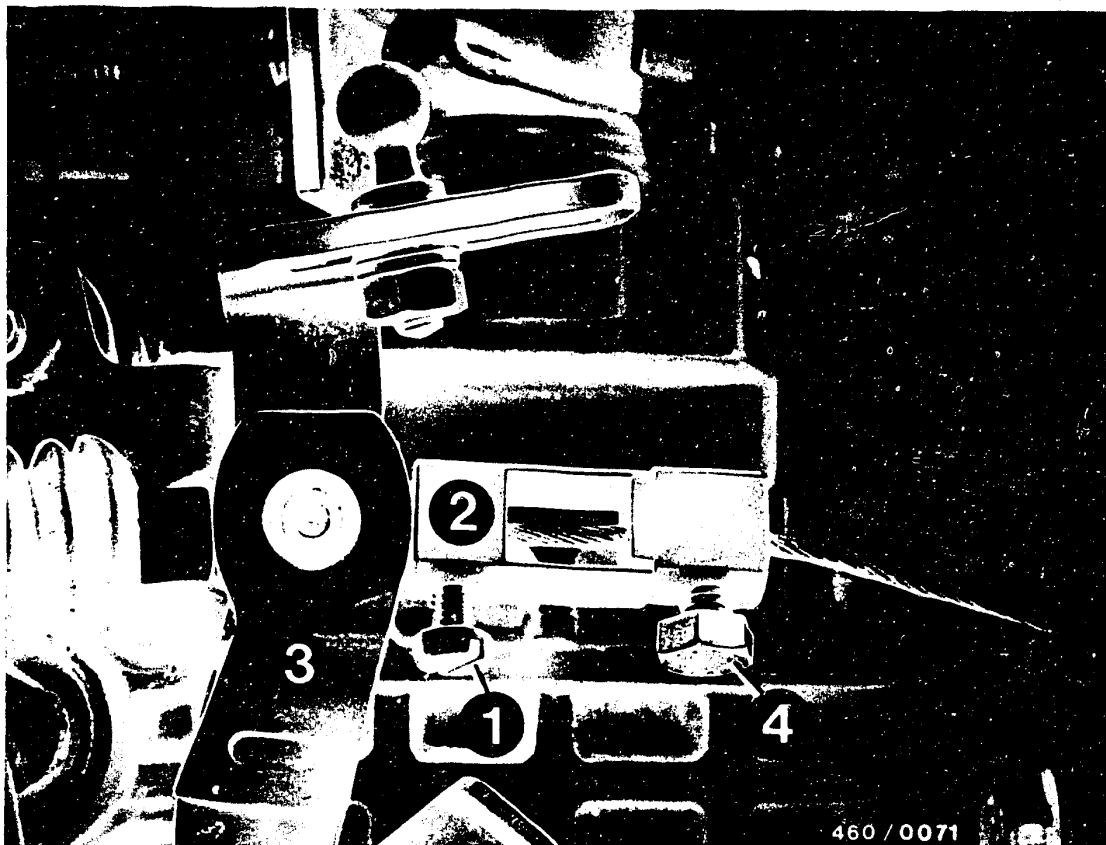
Screw two hexagon nuts onto the injection-pump drive shaft and lock.

Remove injection-pump bleeder screw.

Mount measuring tool KDEP 1085 in the tapped hole of the bleeder screw.

Mount dial indicator 1 687 233 011 with measuring base in measuring tool KDEP 1085.





When testing and setting the start of delivery, the temperature-controlled cold-start accelerator must be in the zero position.

To do this, loosen clamping screw (1) on injection pump. Pull intermediate piece (2) with control lever (3) in direction of hydraulic head.

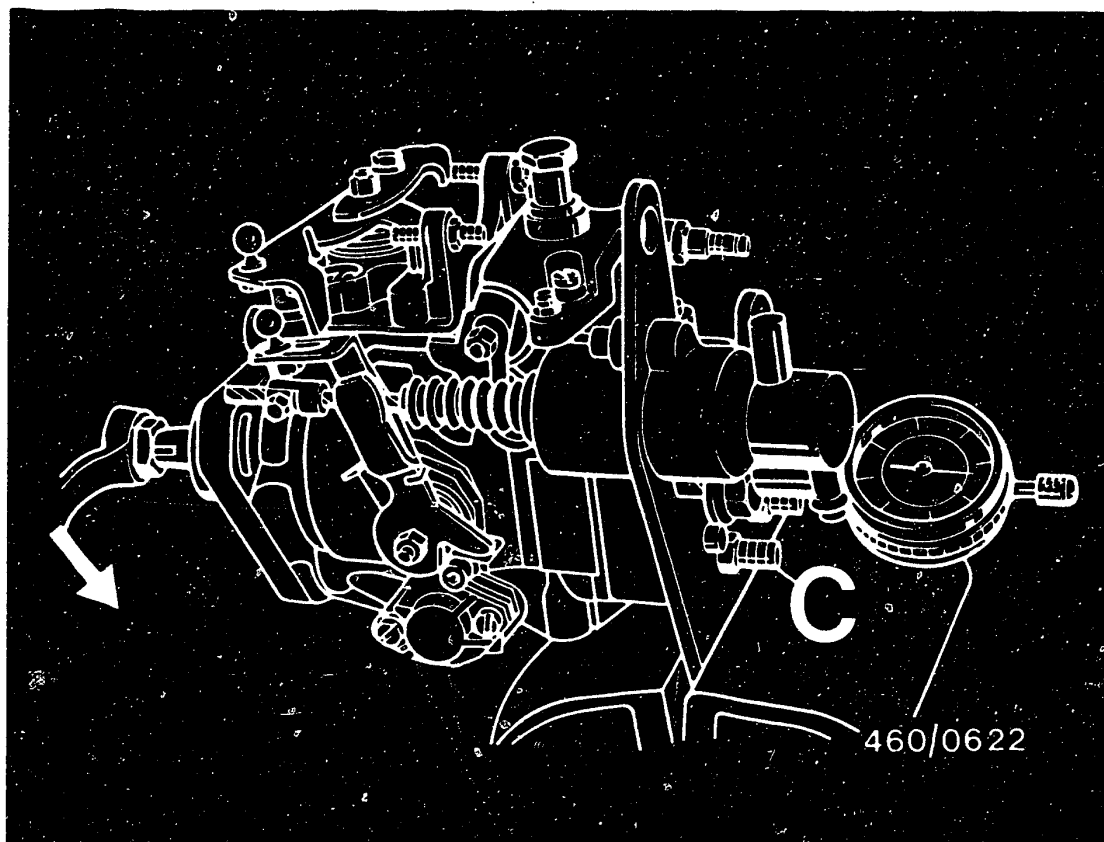
Turn intermediate piece (2) through  $90^\circ$  and push again toward drive shaft until control lever (3) is up against the stop bracket.

In this position the control device is off.

#### Caution!

Locating screw (4) must not be loosened since, otherwise, it will be necessary to reset the control device.





Turn pump shaft in direction of arrow until the distributor-pump plunger reaches its bottom-most position (BDC).

In this position, preload dial indicator by 3 mm and set to "0".

Continue to turn drive shaft in direction of arrow until the V-groove (once again with distributor-pump plunger in BDC position) points to outlet "C" of hydraulic head.

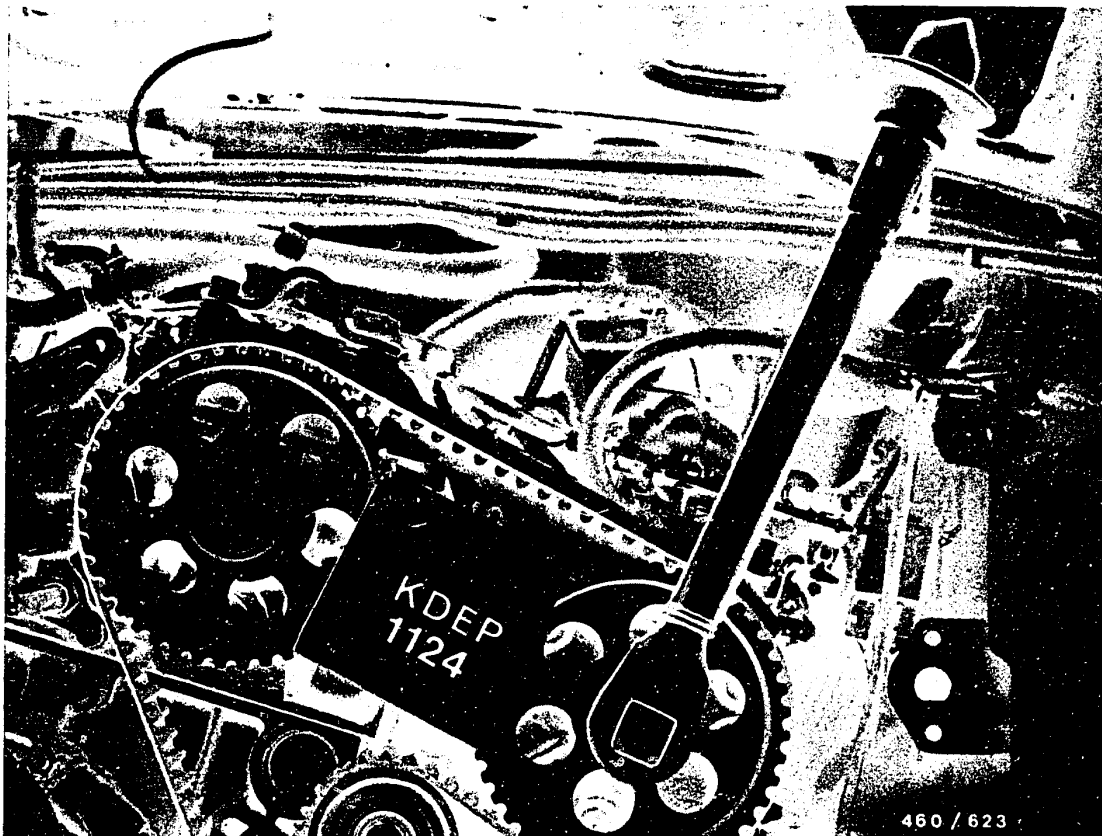
Unscrew hexagon nuts from drive shaft. Do not turn pump shaft any more, with result that distributor-pump plunger remains in BDC position.

**E20**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





Insert Woodruff key in groove in drive shaft.

Introduce injection pump into bore in pump drive gear.

Screw on fastening nuts of injection pump by hand.

Mount plain washer and fastening nut of pump drive gear and tighten to 50 Nm (5 kgfm).

Remove holding device KDEP 1124.

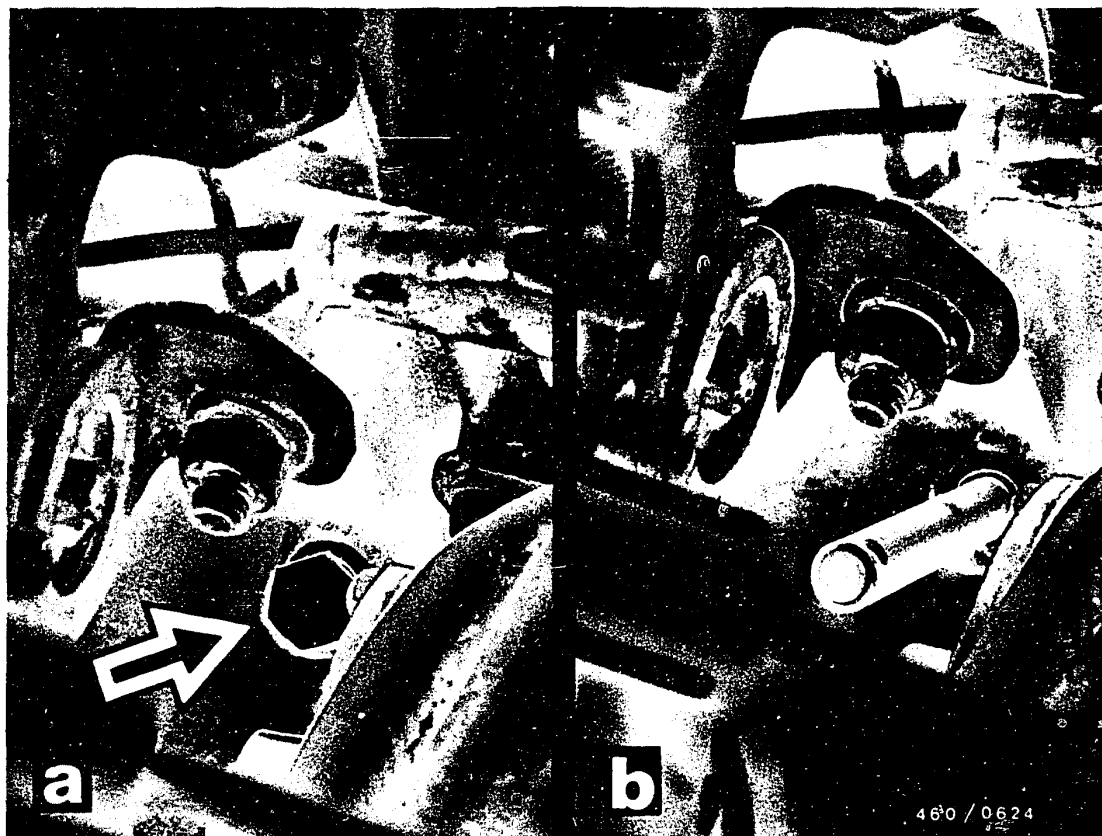
**E21**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD



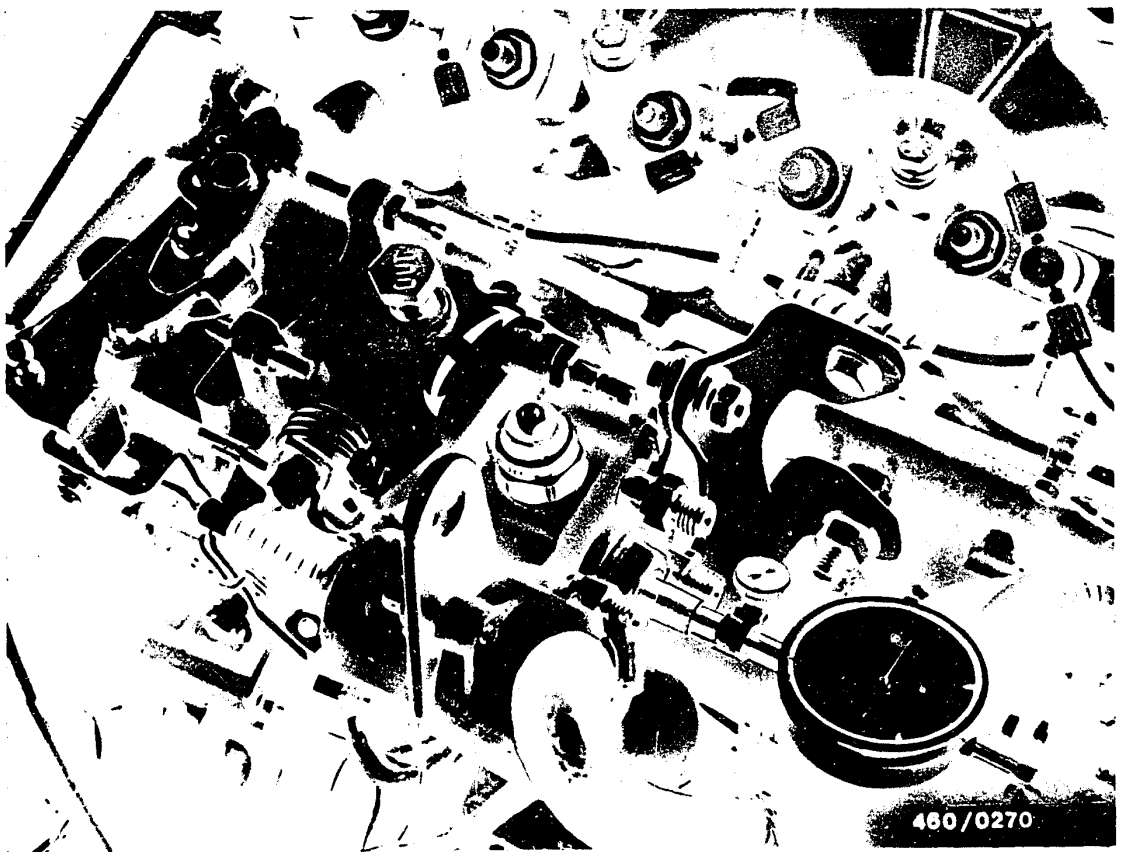




Turn crankshaft over twice in engine direction of rotation and, with cylinder 1 at TDC, fix the position of the crankshaft using setting mandrel KDEP 1123.

To do this, unscrew screw plug on engine block (near injection pump) (arrow, Fig. a) and insert setting mandrel (Fig. b).





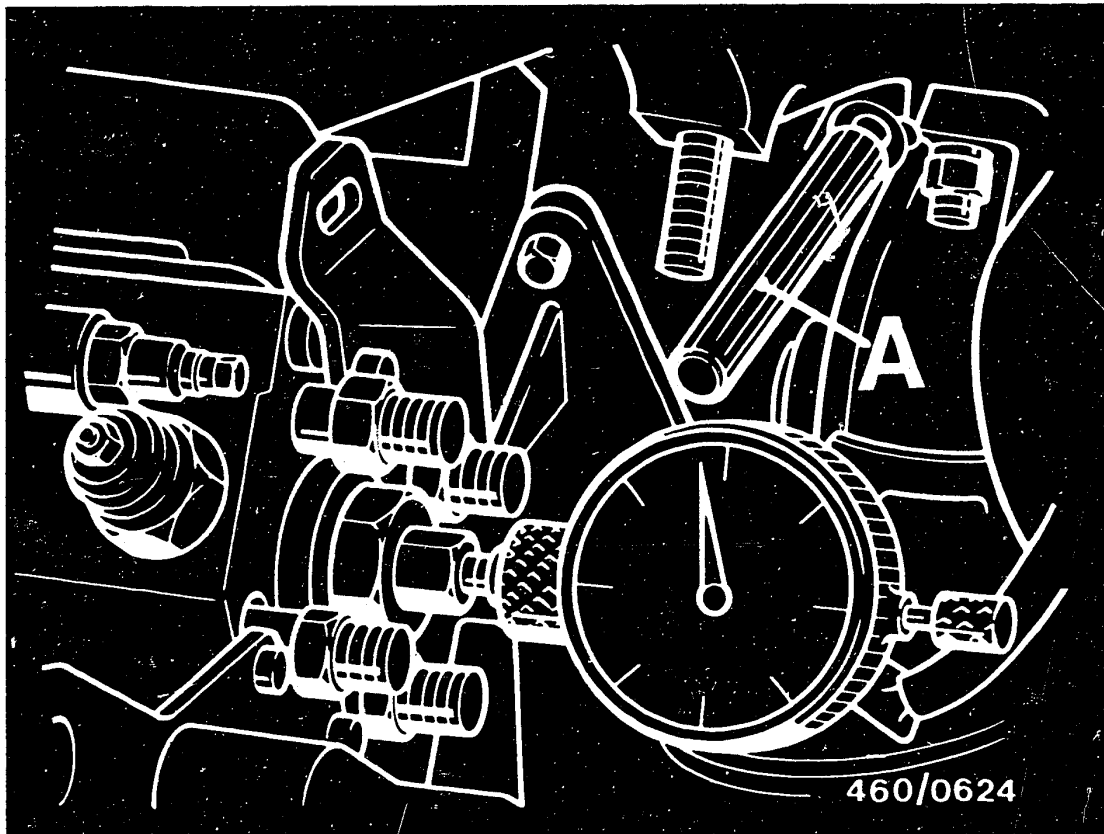
In this position, the dial indicator on the injection pump must indicate a piston stroke of 0.70 mm.  
If necessary, correct by pivoting the injection pump.

**E23**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





A = Setting mandrel KDEP 1123

### Testing the setting

Remove setting mandrel KDEP 1123.

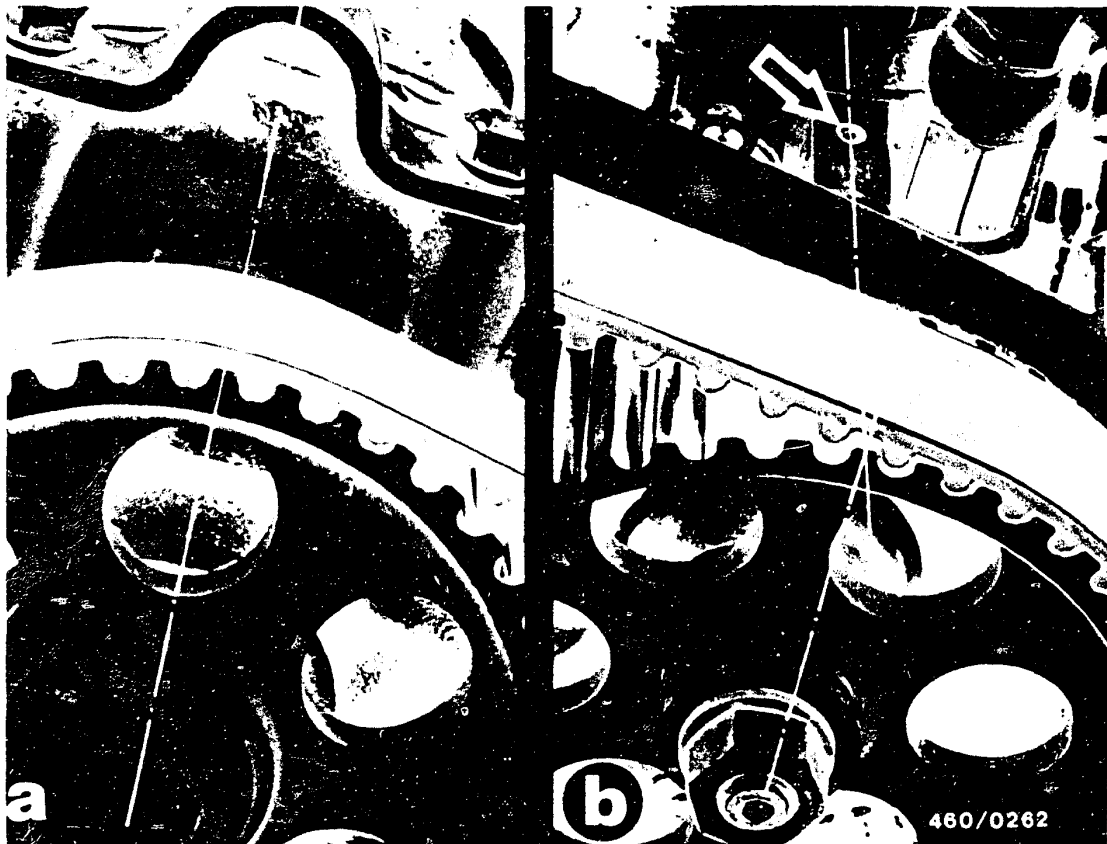
Turn crankshaft  $1 \frac{3}{4}$  turns in direction of rotation.

Check whether dial indicator is at "0" with distributor-pump plunger in BDC position.

Turn crankshaft further as far as TDC position (engine) and lock with setting mandrel KDEP 1123.

The dial indicator on the injection pump must indicate a piston stroke of 0.69 ... 0.71 mm.





With engine in this position, test the position of the timing gears:

Mark on camshaft gear must align with the centre line of the pipe bend on the valve cover (Fig. a).

Mark on pump drive gear points to the centre line of the governor shaft bore (arrow, Fig. b).

Remove setting mandrel KDEP 1123.

Tighten injection-pump fastening nuts to 25 Nm (2.5 kgfm).

Remove measuring tool KDEP 1085 with dial indicator and fit bleeder screw with new copper seal ring.

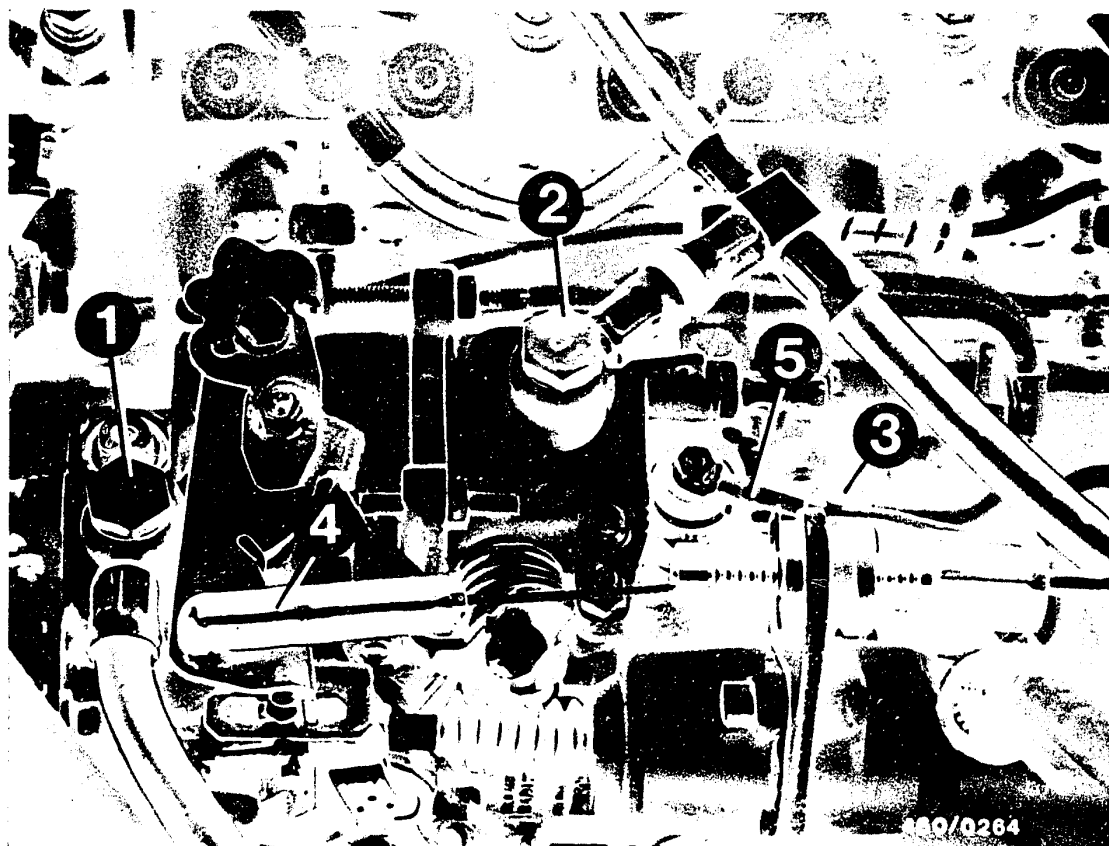
Mount support bracket on injection-pump hydraulic head and tighten fastening screws.

**F1**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





Mount fuel inlet line (1), fuel return line (2), injection lines (3), accelerator cable (4) and electric lead (5) to solenoid-operated valve.

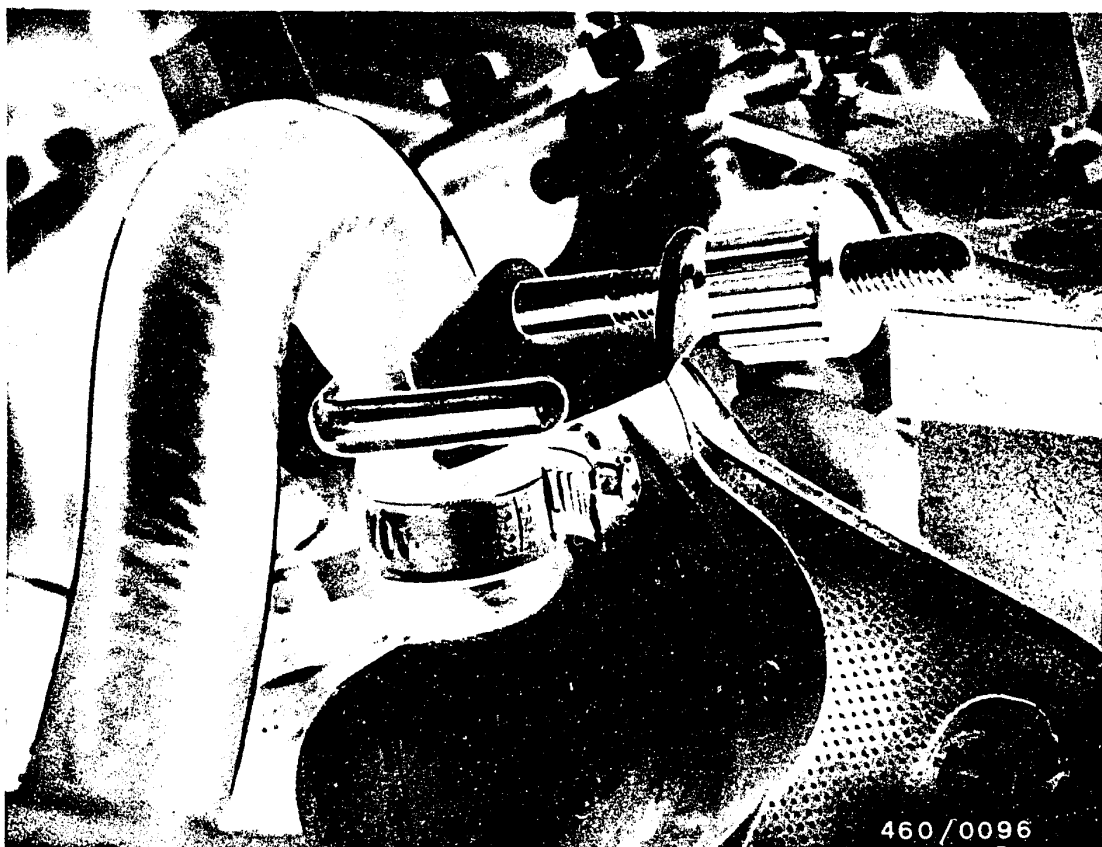
Note:

When tightening the injection lines, prevent the delivery-valve holders from turning by holding with a wrench.

The inlet-union screws of the fuel inlet and return lines must not be mixed up.

The inlet-union screw of the fuel return is provided with restriction bores and the head of the screw is marked "Out".





Connect coolant lines to injection-pump control devices.

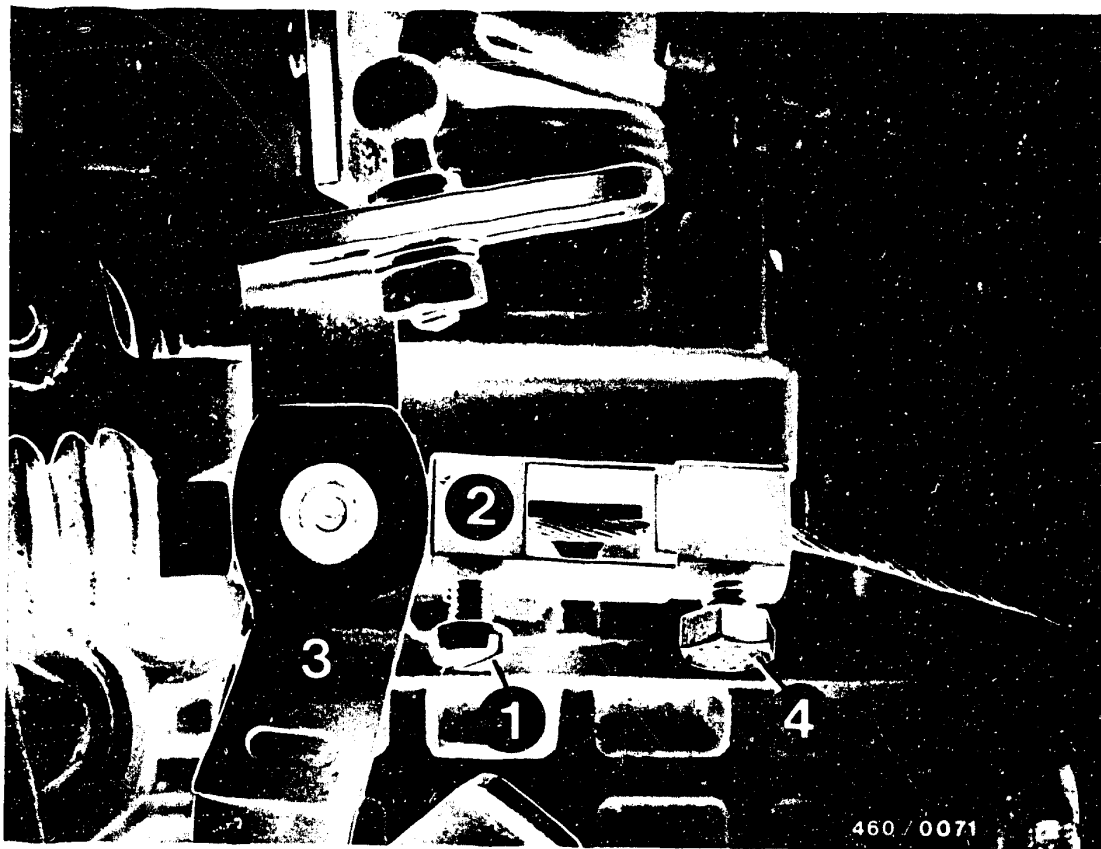
Tighten hose clips.

Remove hose clampers.

**F3**

Install fuel-injection pump  
Renault 18/20 D, 20/30 TD, Fuego TD





Pull control lever (3) with intermediate piece (2) in direction of hydraulic head.

Turn intermediate piece (2) through 90° and push again toward drive shaft.

Intermediate piece is in starting position.

Tighten clamping screw (1).

**F4**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





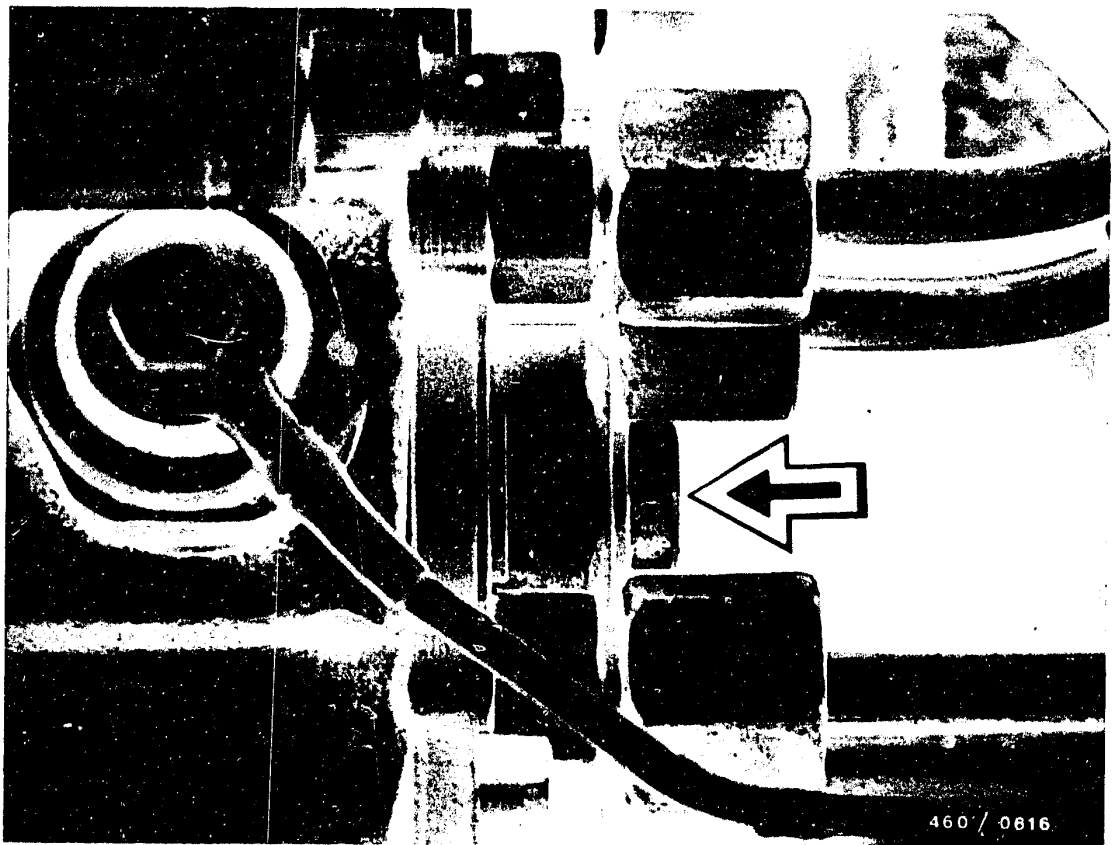
### Bleed fuel system

Fill the fuel filter and injection pump with diesel fuel.

Tighten hose connections on filter cover.







Loosen bleeder screw on injection pump and screw out by a few turns (arrow).

Loosen union nuts of fuel-injection tubing on nozzle holders.

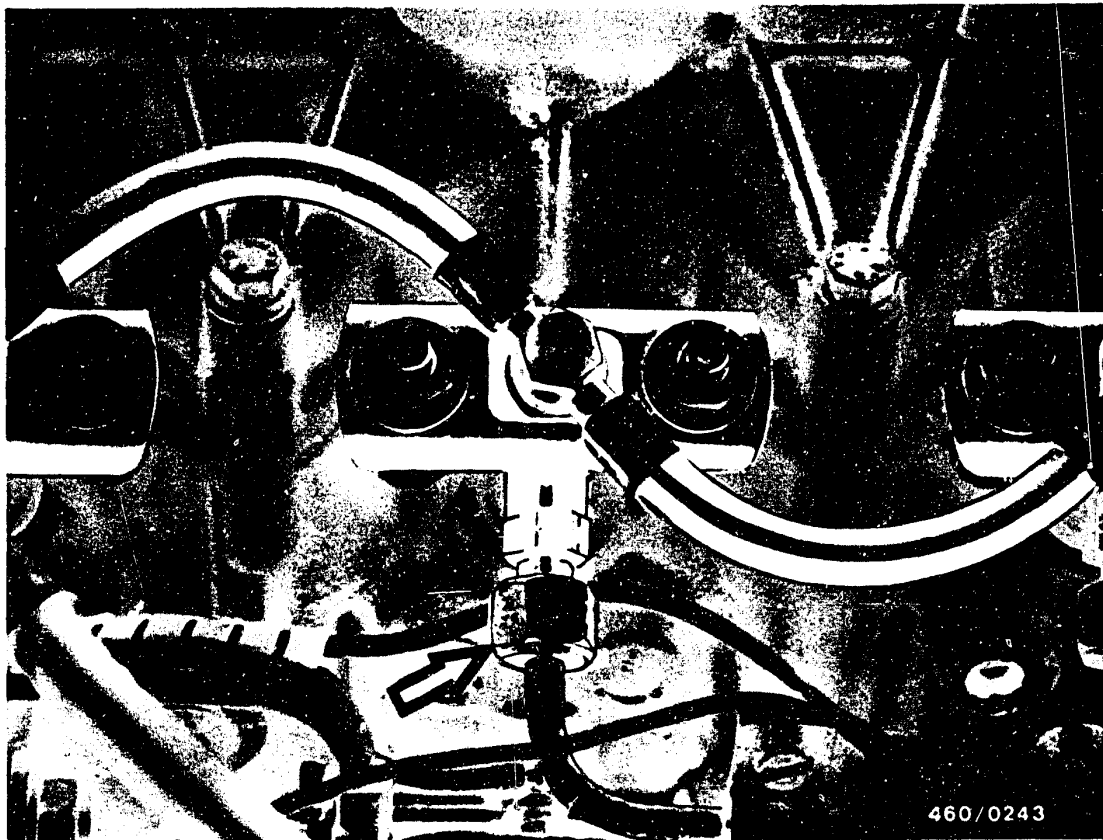
Operate starting motor without preheating. When the fuel escaping from the injection pump bleed hole is free of bubbles, retighten the bleeder screw again.

**F6**

Bleed fuel system

Renault 18/20 D, 20/30 TD, Fuego TD





Continue to operate starting motor until fuel escapes from the union nuts of the nozzle holders (arrow).

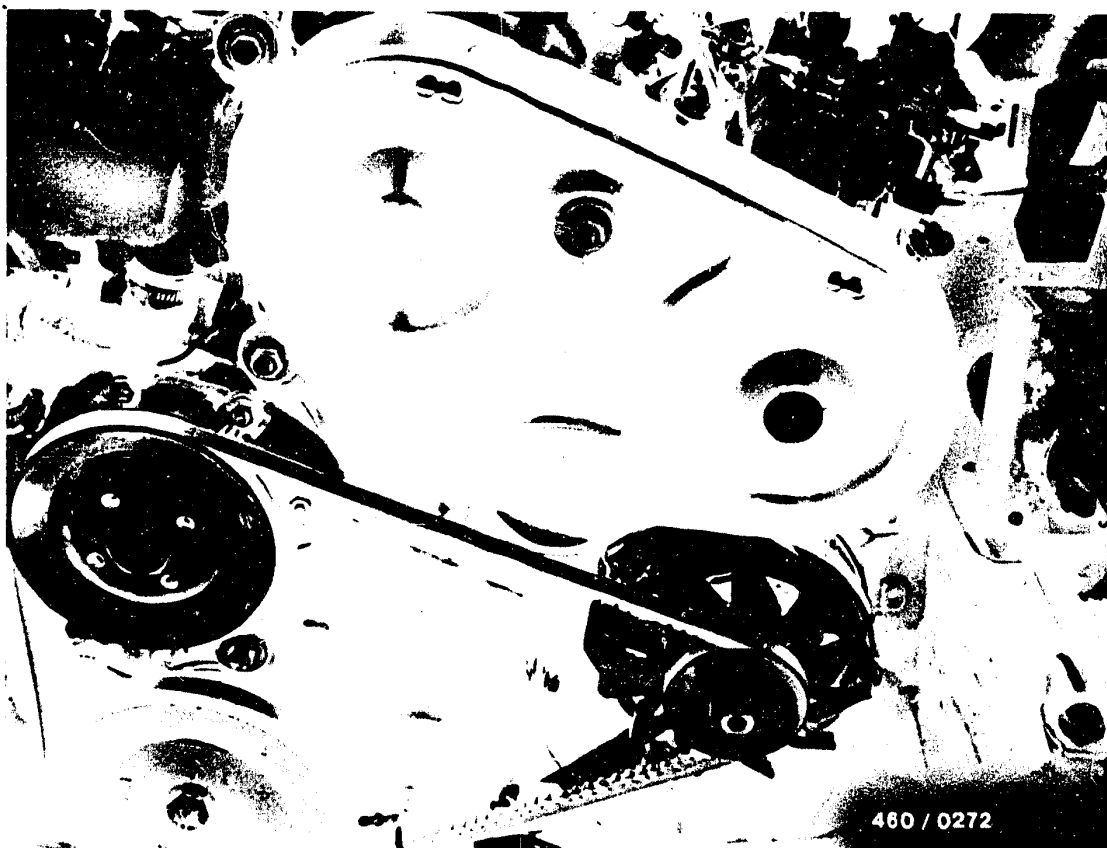
Tighten union nuts and operate starting motor until engine starts.

**F7**

Bleed fuel system

Renault 18/20 D, 20/30 TD, Fuego TD





Mount timing case and tighten fastening screws.

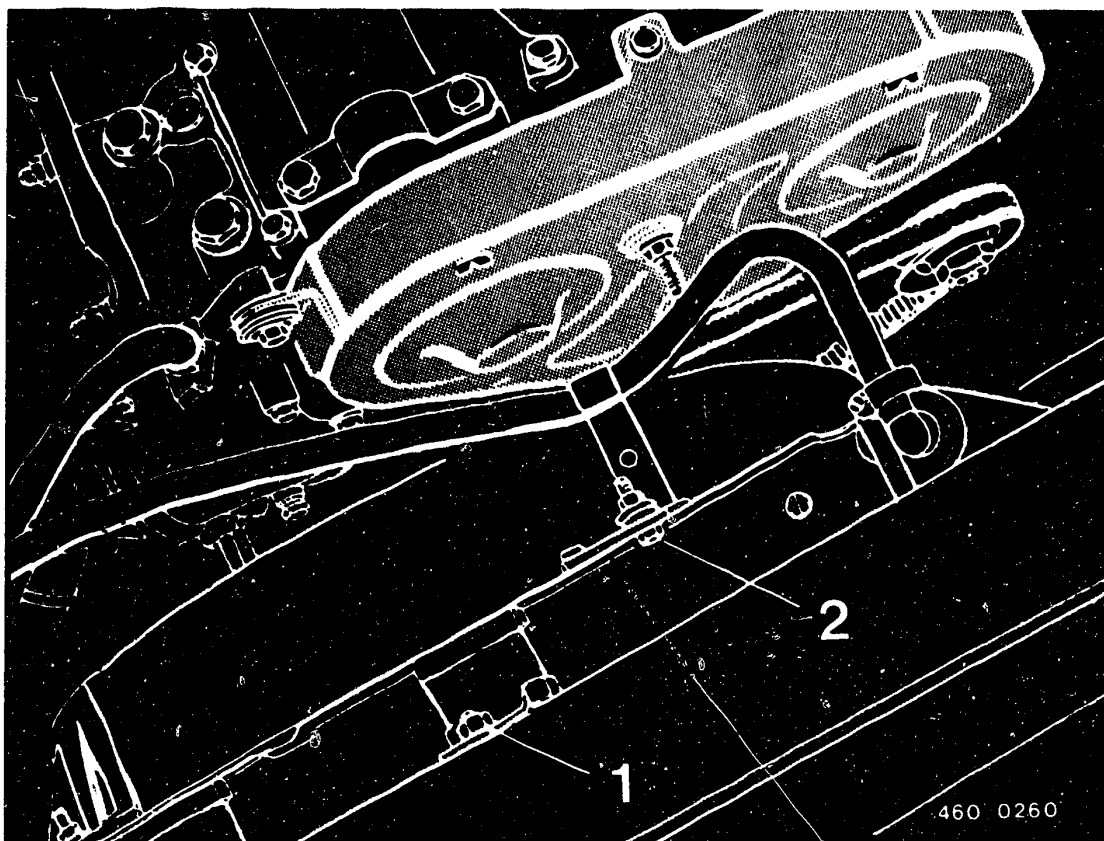
Position generator V-belt and tension.

**F8**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





The following operations do not apply to  
Renault 18 D

Tilt radiator and introduce air guide.

Mount air-guide fastening screws and nuts and tighten.

Insert upper radiator fastening screws and tighten.

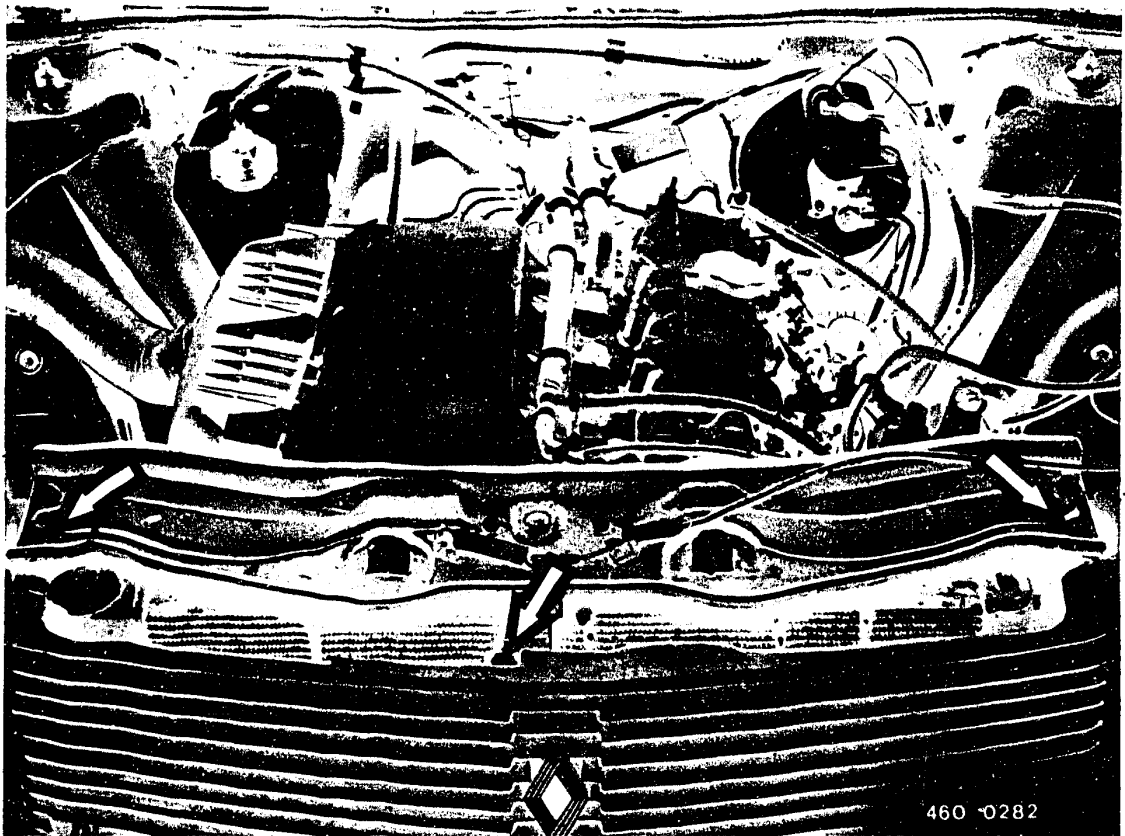
Connect negative cable to battery.

**F9**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





The following operations apply only to  
Renault 18 D

Pivot radiator into engine compartment and press bearing plug.

Mount overflow hose on radiator and remove hose clamber.

Install radiator grille and screw down.

Position lock carrier plate and fit fastening screws (arrows).

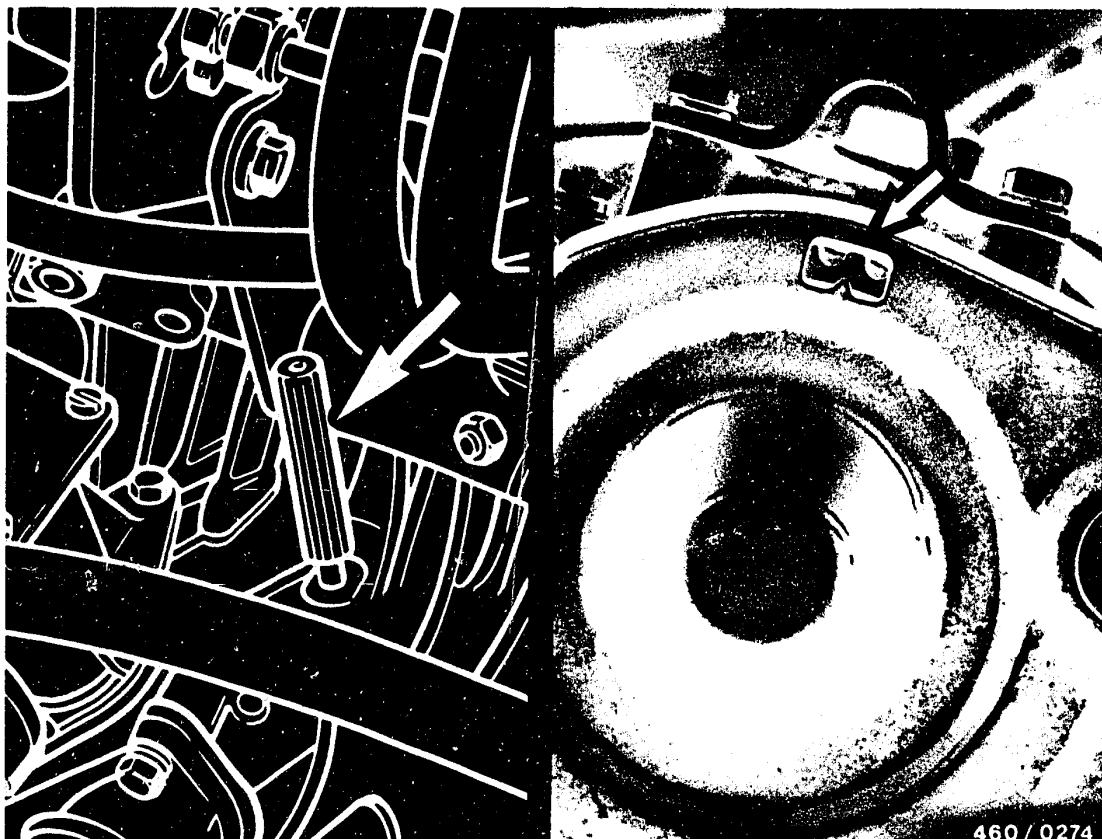
Connect negative cable to battery.

**F10**

Install fuel-injection pump

Renault 18/20 D, 20/30 TD, Fuego TD





460 / 0274

## 26. Test and adjust engine timing

### 26.1 Test engine timing

The following operations apply to a 1 1 vehicle models:

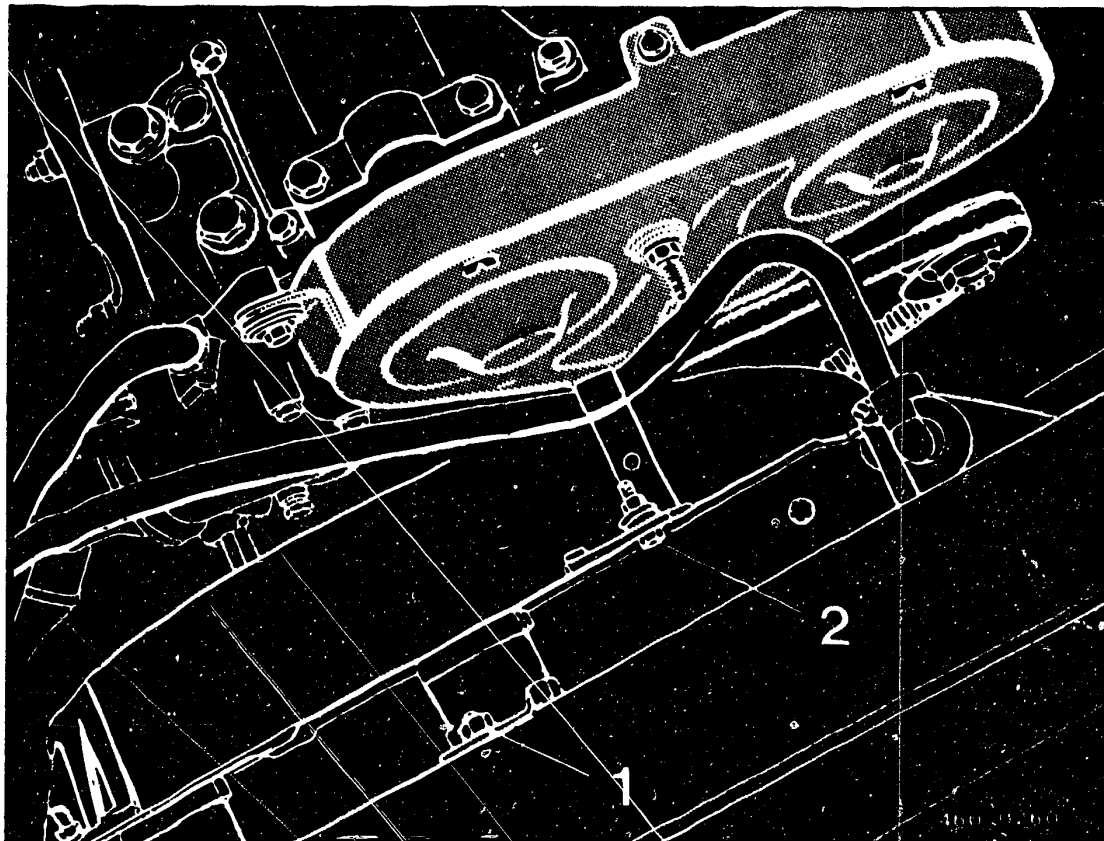
Turn engine crankshaft and set cylinder 1 to TDC position.

Lock crankshaft using setting mandrel KDEP 1123 (Fig. a - arrow).

In this position, the pointer on the timing case and the mark on the camshaft gear must in alignment (Fig. b).

If these marks are not in alignment, it is necessary to correct the engine timing.





## 26.2 Adjust engine timing

The following operations do not apply to  
Renault 18 D

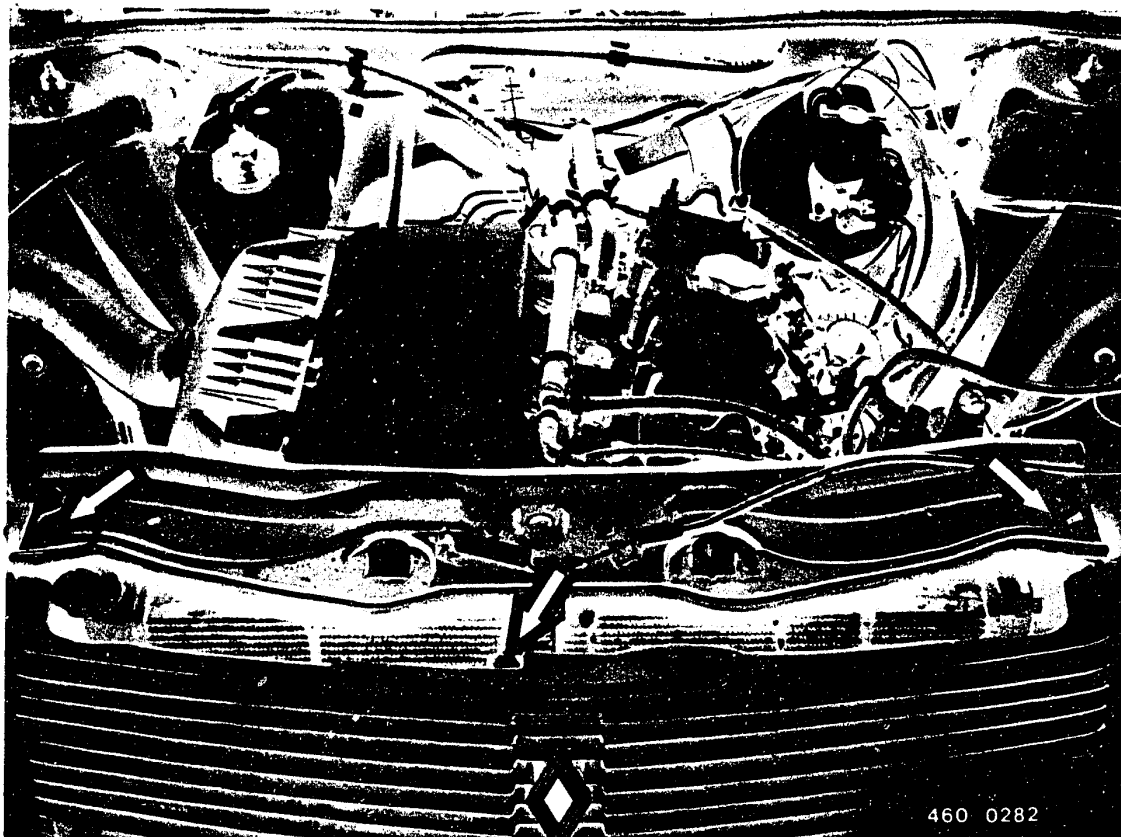
Loosen generator fastening screws and remove V-belt.

Remove upper fastening screws (1) of radiator.

Unscrew fastening screws (2) and nuts of air guide.

Tilt radiator and remove air guide.





The following operations apply only to  
Renault 18 D

Unscrew fastening screws of lock carrier plate (arrow).

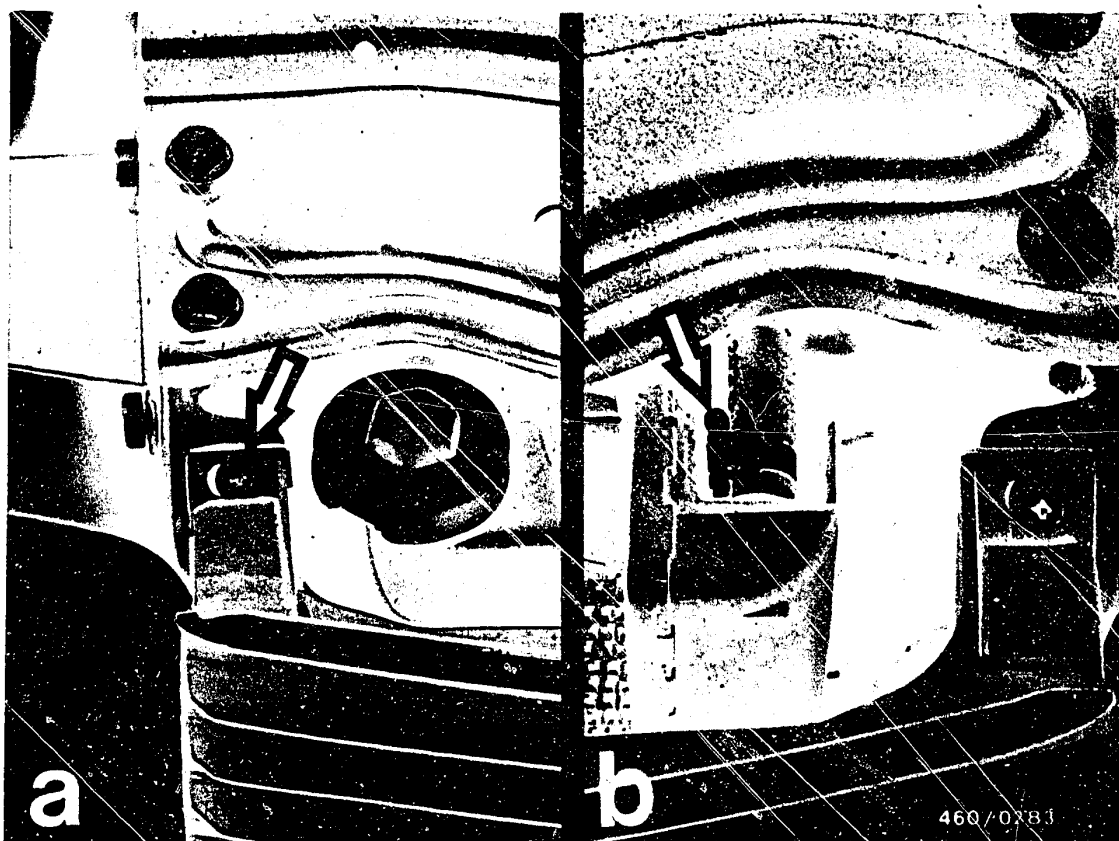
Remove lock carrier plate.

**F13**

Test and adjust engine timing  
Renault 18/20 D, 20/30 TD, Fuego TD







Remove radiator grille fastening screws (arrow, Fig. a) and remove radiator grille.

Pinch off overflow hose on radiator (arrow, Fig. b) by means of hose clammer and pull off radiator.

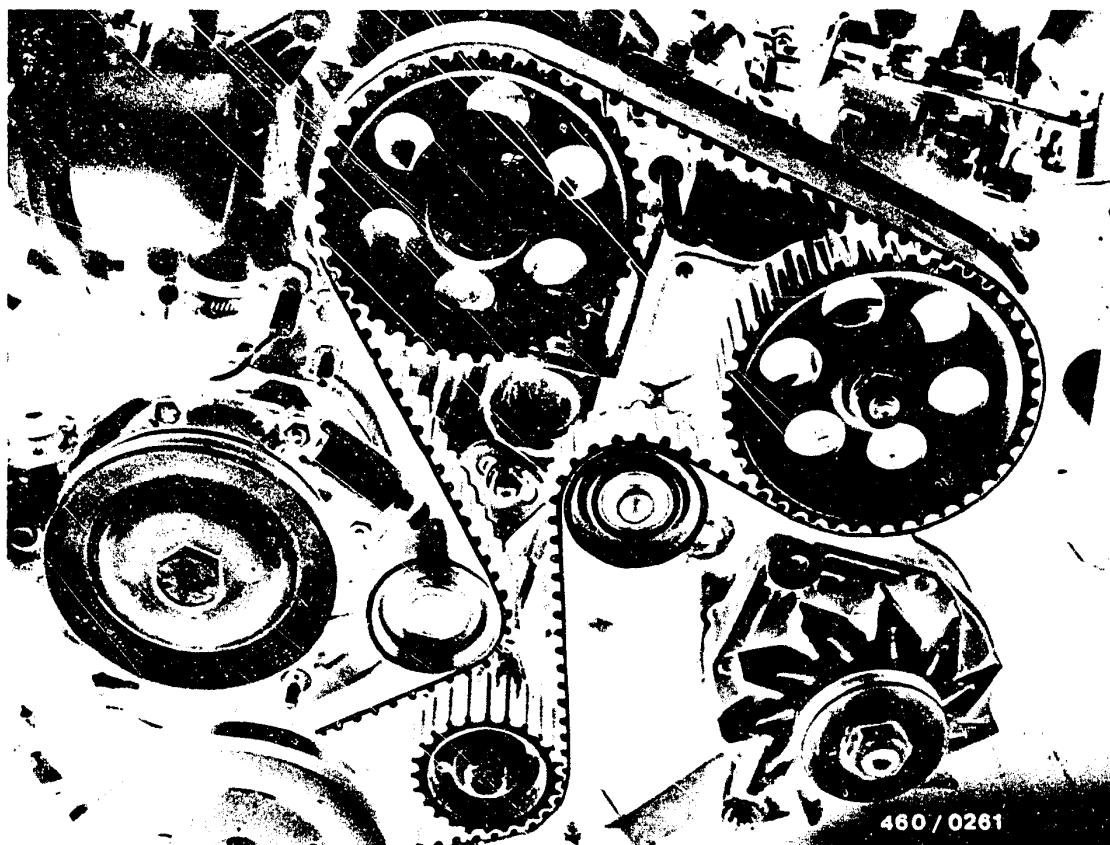
Seal off fitting on radiator with plastic cap.

Raise radiator and tilt to the left slightly out of the engine compartment.

Support radiator from below.

Loosen generator fastening screws and remove V-belt.





The following operations apply to a 1 l vehicle models

Remove timing case fastening screws.

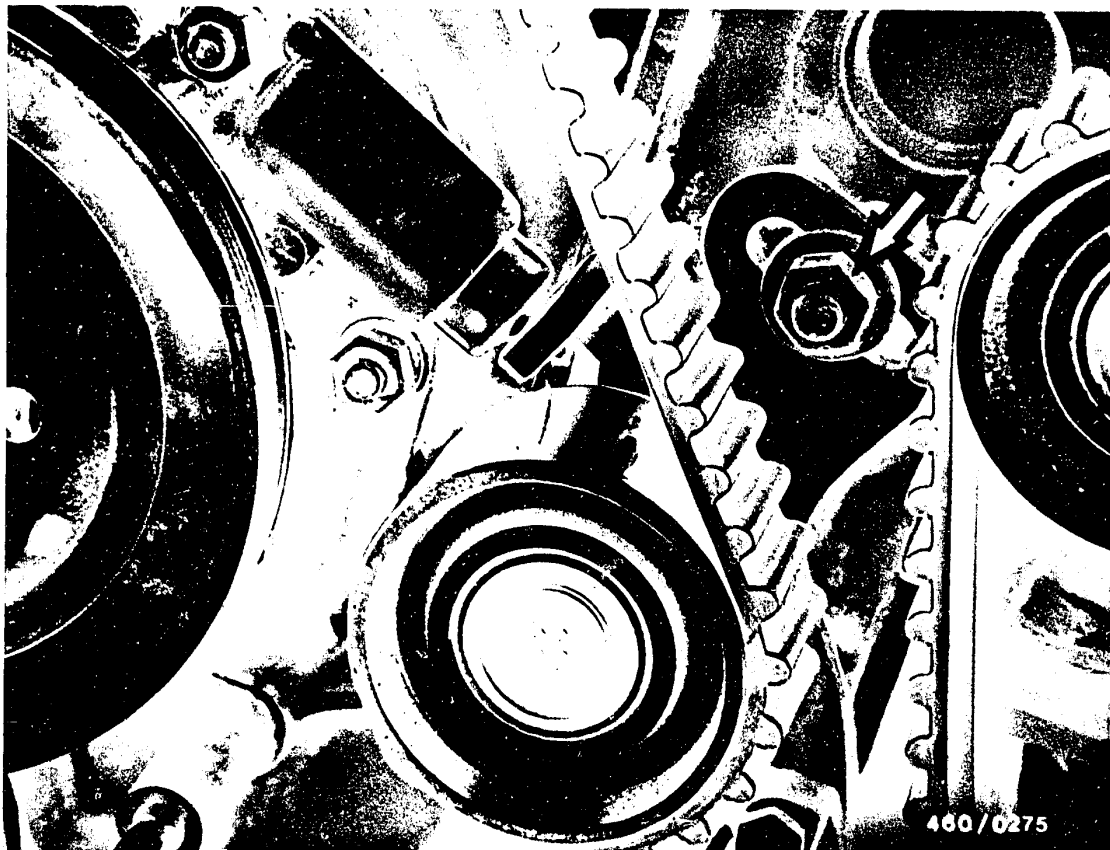
Remove timing case from engine. When doing this, it may be necessary to move the fan wheel.

**F15**

Test and adjust engine timing

Renault 18/20 D, 20/30 TD, Fuego TD



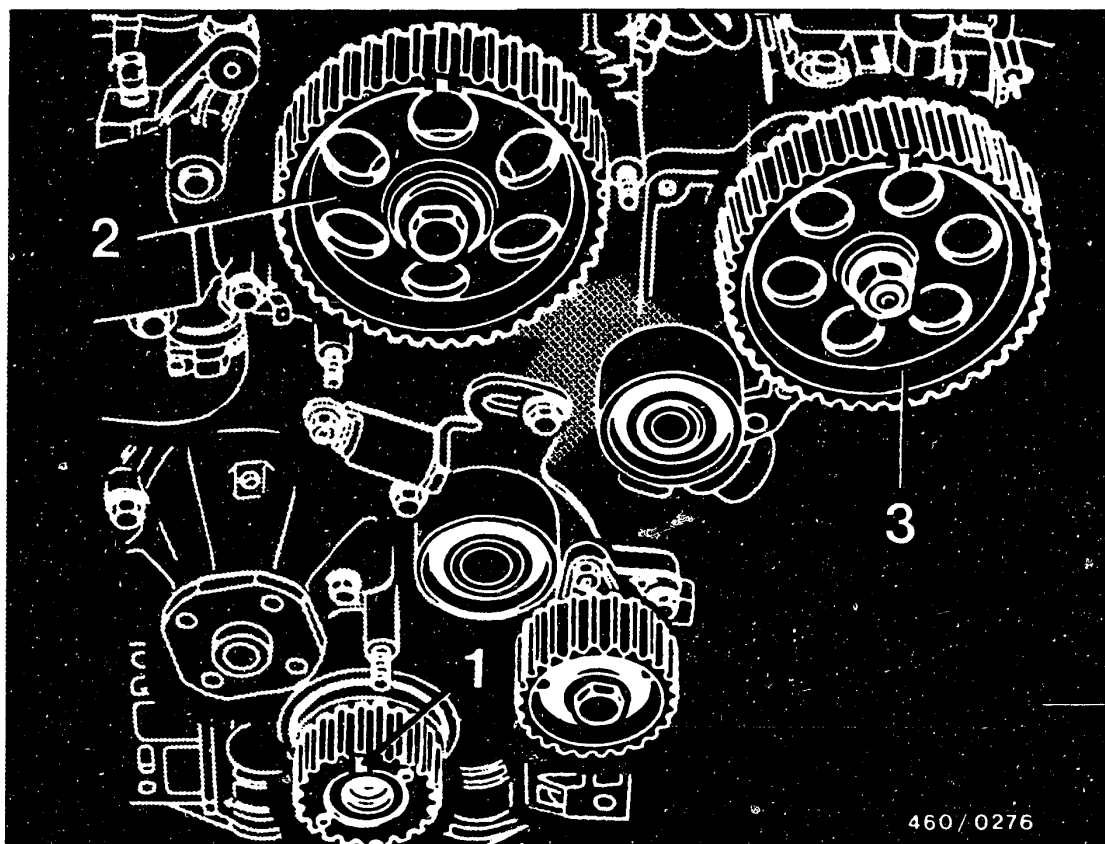


Loosen fastening nuts (arrow) of tensioning-wheel bracket.

Press tensioning wheel against spring tensioner and tighten bracket fastening screw.

Remove toothed belt.



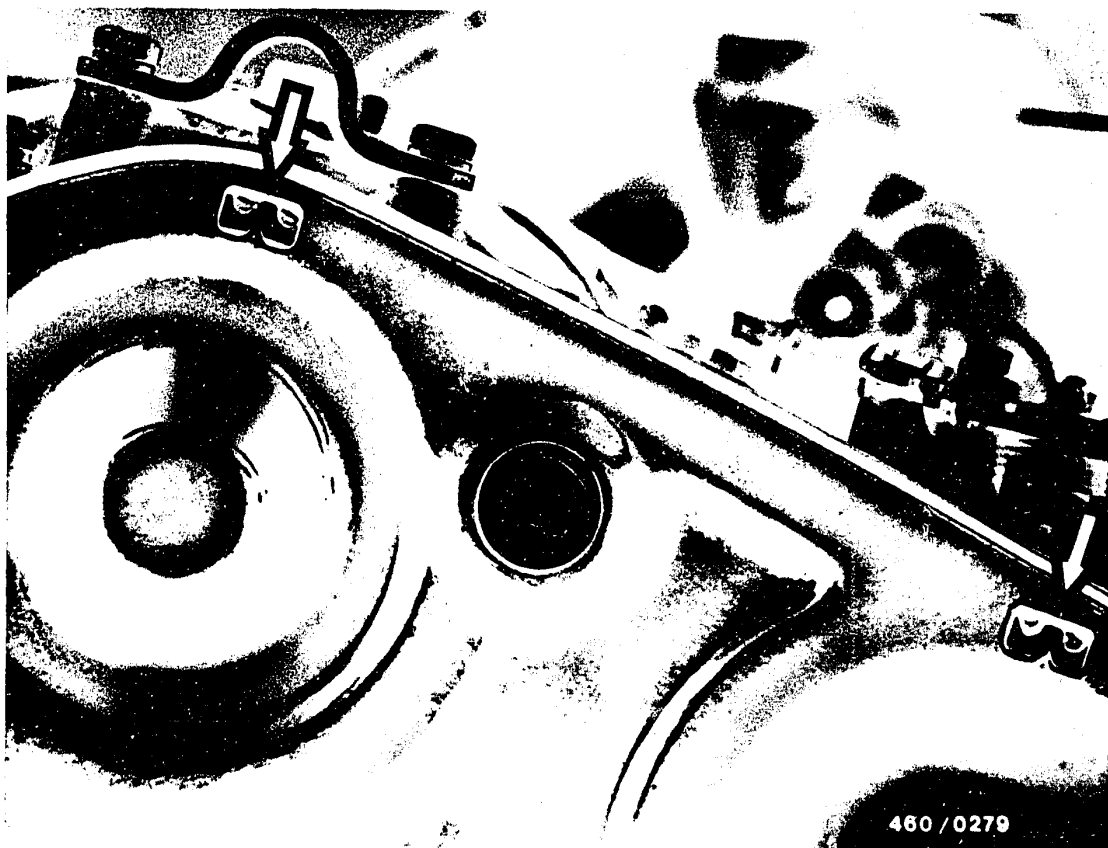


The mark on the crankshaft gear (1) must point vertically upward.

Turn camshaft gear (2) so that mark on camshaft gear aligns with centre line of valve cover.

The mark on the pump drive gear (3) points to the centre line of the governor shaft bore.





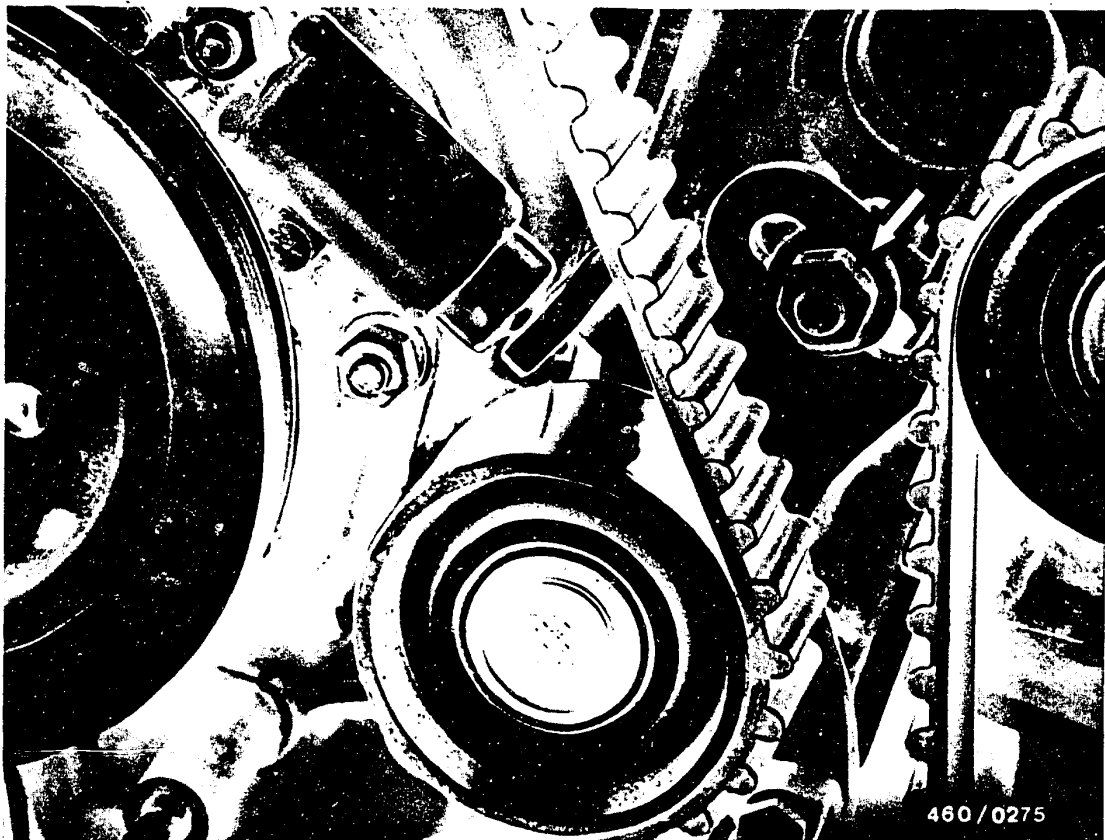
By provisionally mounting the toothed-belt cover it is possible to check the correct position of camshaft gear and injection-pump drive gear through inspection holes (arrows).

**F18**

Test and adjust engine timing

Renault 18/20 D, 20/30 TD, Fuego TD





Put on the toothed belt without moving the drive gears.

Loosen tensioning wheel bracket fastening screw.

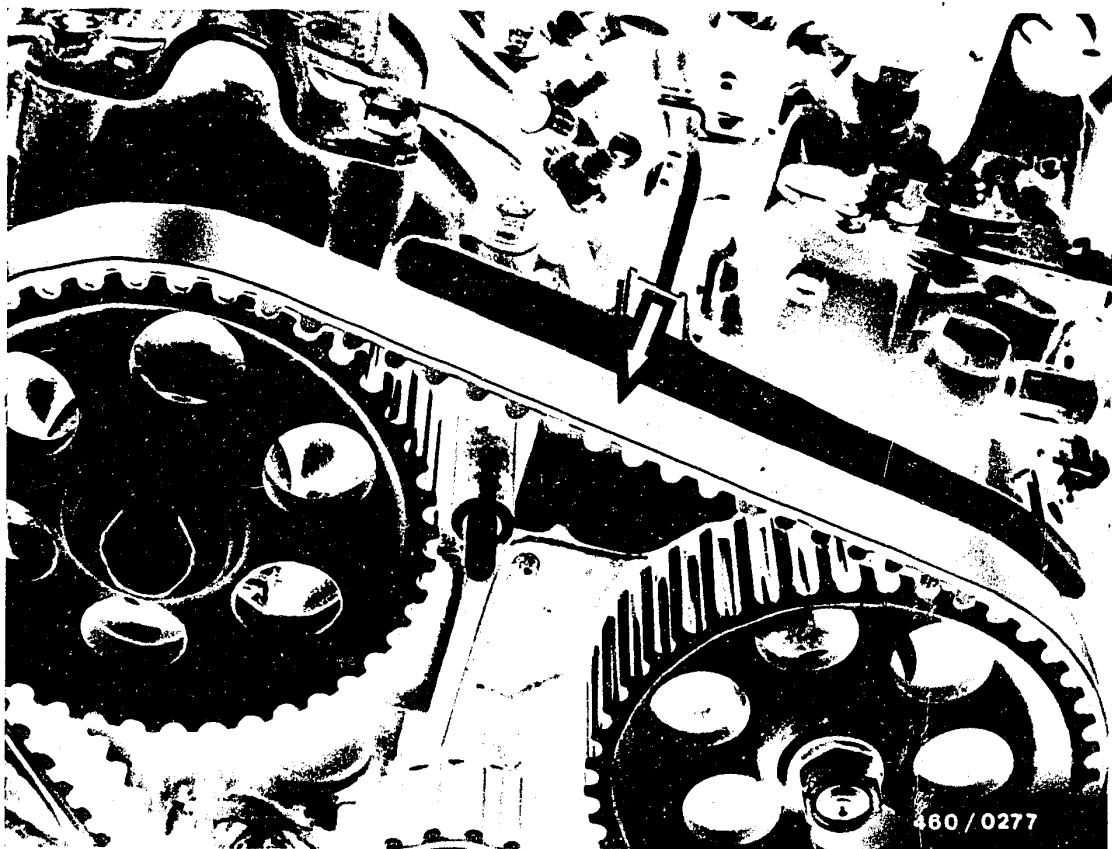
Remove setting mandrel KDEP 1123.

Turn crankshaft over two full times in engine direction of rotation until marks are again in alignment.

Tighten tensioning wheel bracket fastening screw.

Test tension of toothed belt.





Test tension of toothed belt using belt tension tester KDEP 1121.

Turn vernier sleeve until bottom edge of sleeve aligns with the line mark on the measuring tongue.

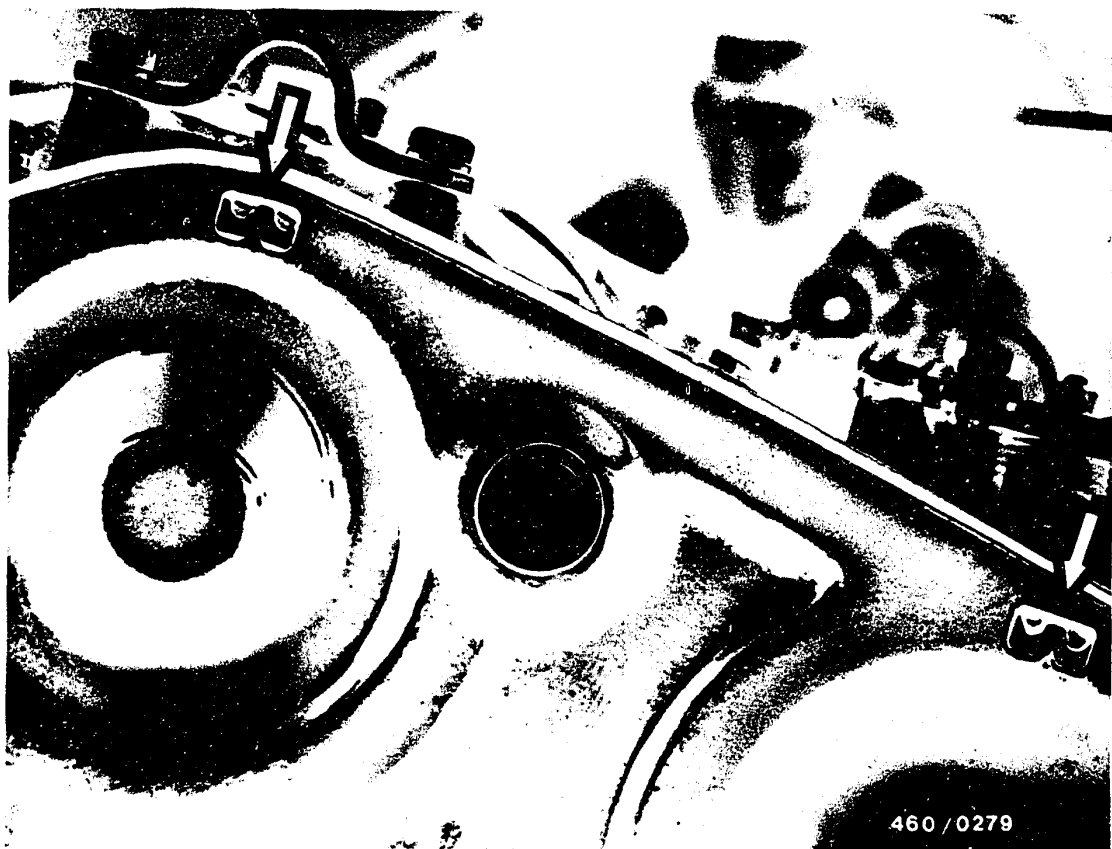
Make reading

Should be: scale value 14 ... 15

Mount timing case.

Put on generator V-belt and tension.





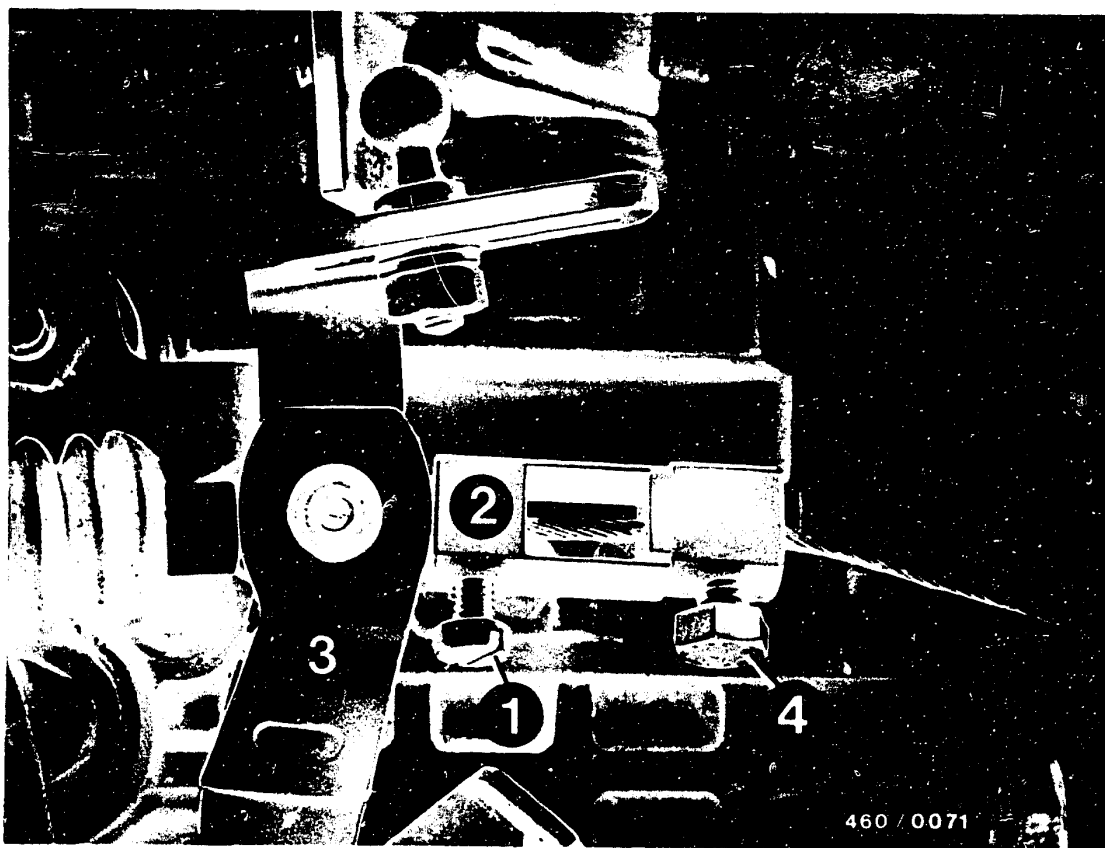
Check whether marks on camshaft gear and injection-pump gear are in alignment with the pointers of the setting windows.

**F21**

Test and adjust engine timing  
Renault 18/20 D, 20/30 TD, Fuego TD







To test and adjust the start of delivery, the temperature-controlled cold-start accelerator must be in the zero position.

To do this, loosen clamping screw (1) on injection pump. Pull intermediate piece (2) with control lever (3) in direction of hydraulic head.

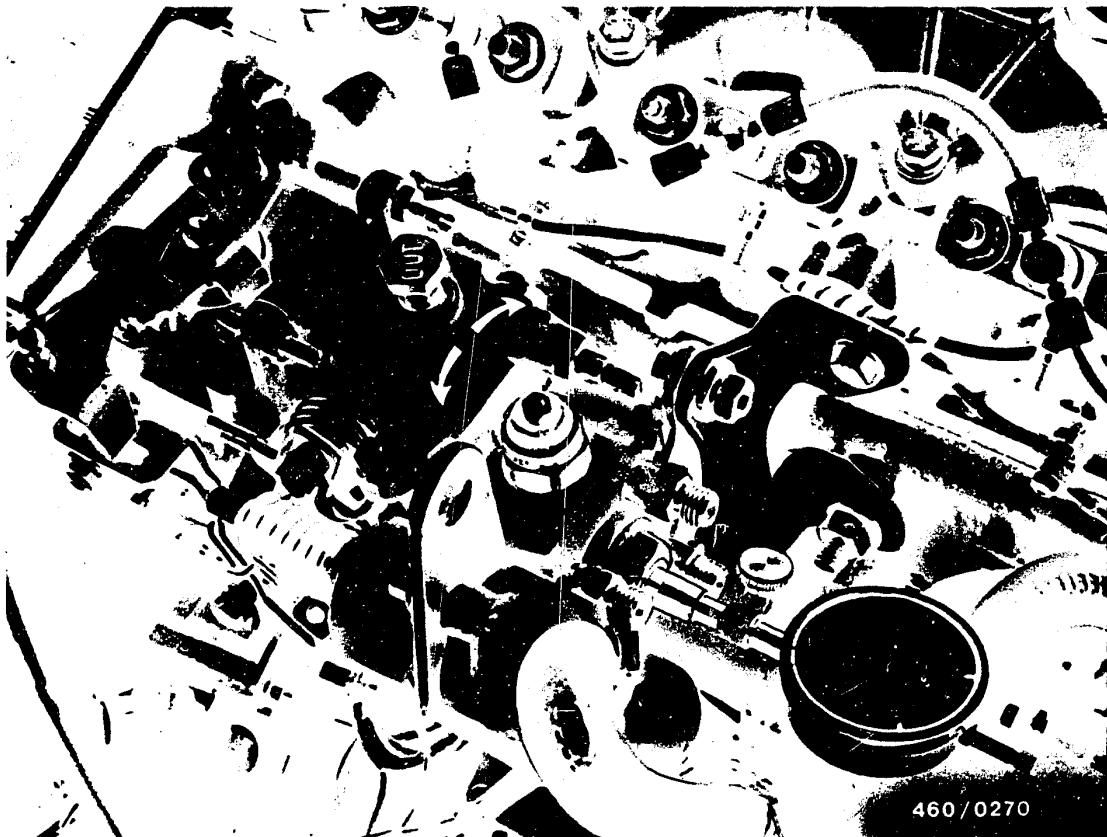
Turn intermediate piece (2) through 90° and push again toward drive shaft until control lever (3) comes up against stop bracket.

In this position, the control device is off.

Note:

Locating screw (4) must not be loosened since otherwise it will be necessary to re-set the control device.





Remove injection lines from injection pump and nozzle-holder assemblies.

(Prevent delivery-valve holders from coming loose by holding with a wrench).

Unscrew bleeder screw from central screw plug (triangular plug) of hydraulic head.

Mount measuring tool KDEP 1085 with dial indicator.

Preload dial indicator by approx. 3 mm.



Turn crankshaft slowly against engine direction of rotation until pointer of dial indicator no longer moves.

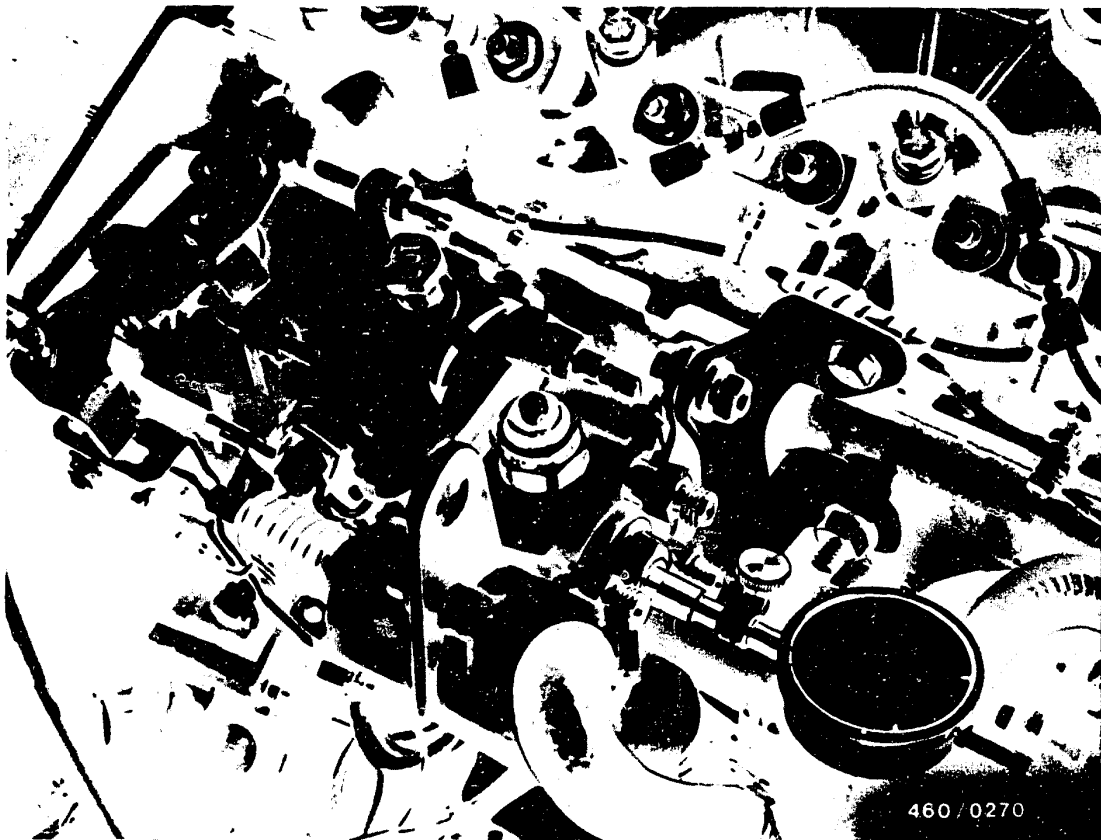
Set dial indicator to "0".

Turn crankshaft in engine direction of rotation until marks on camshaft gear and injection-pump gear are in alignment with the appropriate pointers.

Lock position of crankshaft with setting mandrel KDEP 1123.

The dial indicator must indicate a stroke of 0.69...0.71 mm as checking dimension.





If a correction is necessary, loosen injection-pump fastening screws and, by pivoting the pump, set a stroke of 0.70 mm ABDC.

Remove setting mandrel KDEP 1123.

Tighten injection-pump fastening screws to 25 Nm.

Remove measuring tool KDEP 1085 with dial indicator.

Mount bleeder screw with new seal ring.

**G1**

Test and adjust engine timing  
Renault 18/20 D, 20/30 TD, Fuego TD



Secure injection lines on injection pump and nozzle-holder assembly.

Note:

When tightening, prevent the delivery-valve holders from turning by holding with a wrench.

The following operations do not apply to Renault 18 D

Tilt radiator and install air guide.

Screw in air-guide fastening screws and nuts and tighten.

Screw on upper fastening screws of radiator.

The following operations apply only to Renault 18 D:

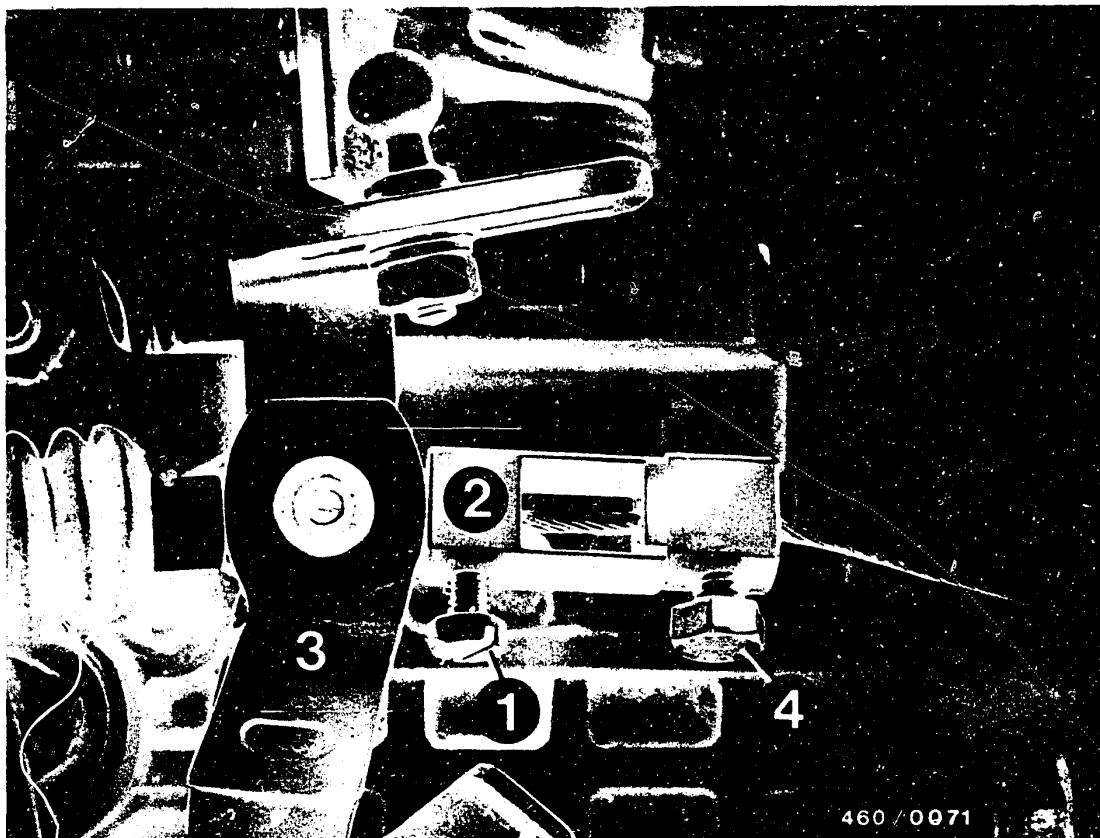
Pivot radiator into engine compartment and press into bearing plug.

Mount overflow hose on radiator and remove hose clamber.

Install radiator grille and screw down.

Position lock carrier plate and fit fastening screws.





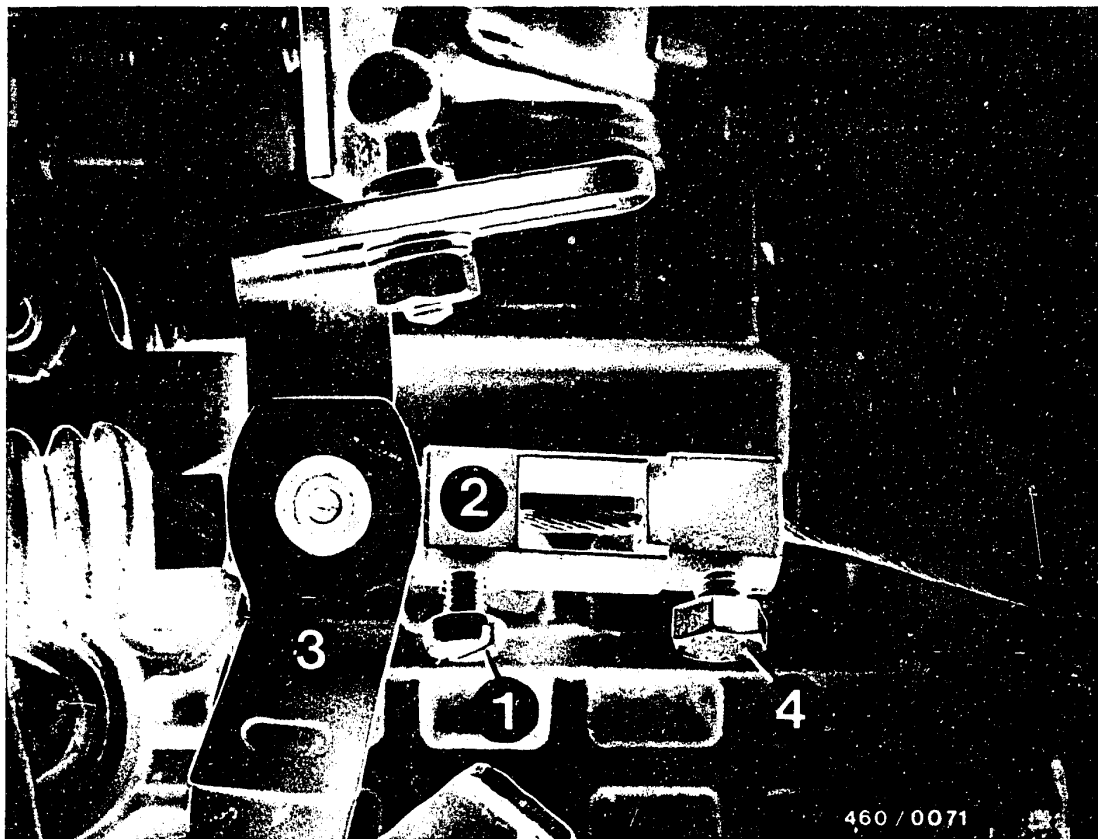
Pull control lever (3) with intermediate piece (2) in direction of hydraulic head.

Turn intermediate piece (2) through 90° and push again toward drive shaft.

Intermediate piece is in starting position.

Tighten clamping screw (1).





## 27. Injection timing

When testing and setting the start of delivery, the temperature-controlled cold-start accelerator must be in the zero position.

To do this, loosen clamping screw (1) on injection pump.

Pull intermediate piece (2) with control lever (3) in direction of hydraulic head.

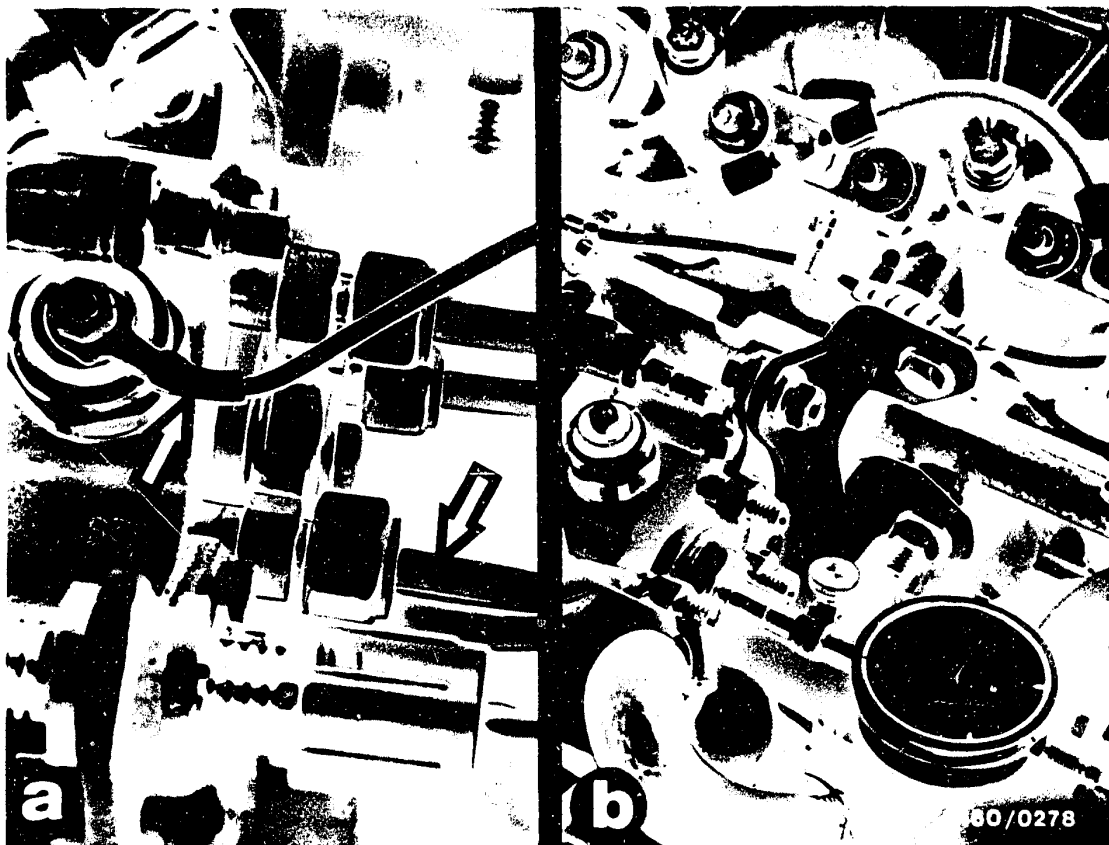
Turn intermediate piece (2) through 90° and push again toward drive shaft until control lever (3) is up against the stop bracket.

In this position the control device is off.

### Caution!

Locating screw (4) must not be loosened since, otherwise, it will be necessary to reset the control device.





Remove injection lines and electric lead for solenoid-operated valve (arrows, Fig. a).  
(Prevent delivery-valve holders from coming loose by holding with a wrench).

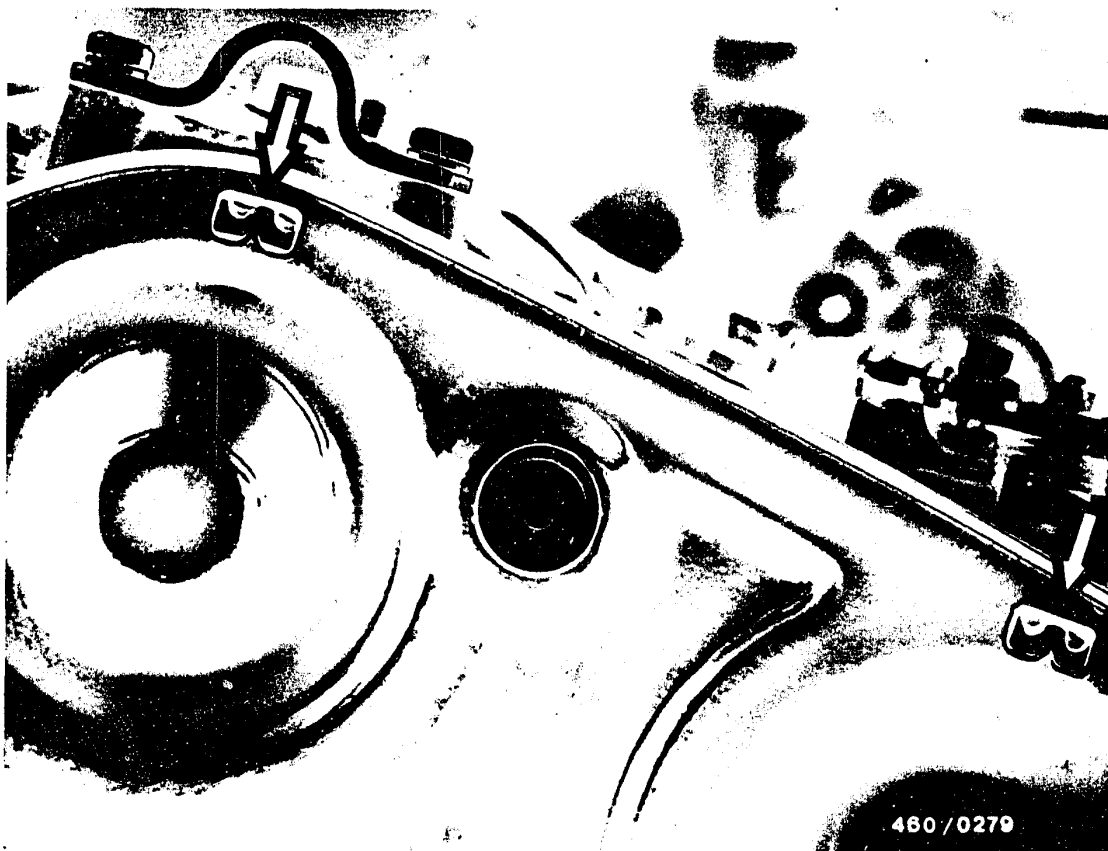
Remove bleeder screw from central screw plug (triangular plug) of hydraulic head.

Mount measuring tool KDEP 1085 with dial indicator.

Preload dial indicator by approx. 3 mm.







Turn engine crankshaft so that marks on camshaft gear and injection-pump gear are in alignment with the pointers of the setting windows.

Turn back crankshaft against direction of rotation until the pointer of the dial indicator no longer moves.

Set dial indicator to "0".

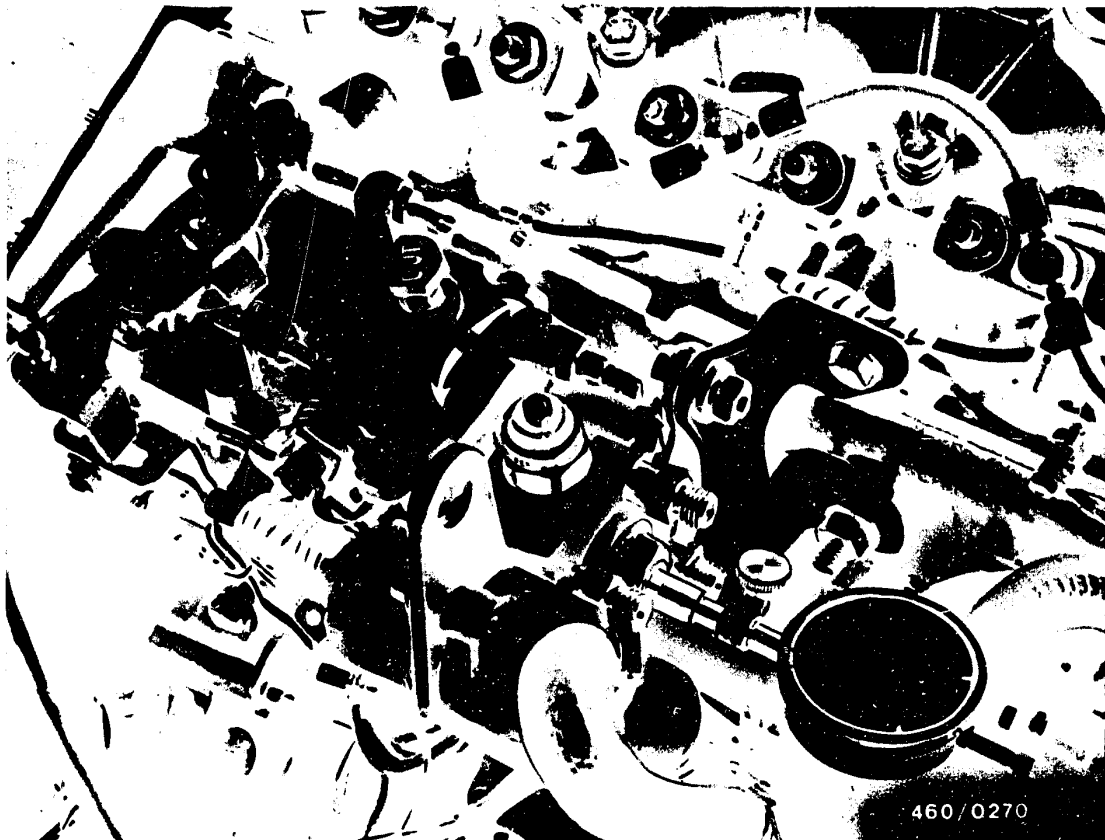
Turn crankshaft in engine direction of rotation until marks on camshaft gear and injection-pump gear align again with the appropriate pointers.

**G6**

Injection timing

Renault 18/20 D, 20/30 TD, Fuego TD





Lock position of crankshaft with setting mandrel KDEP 1123.

The dial indicator must indicate a stroke of 0.69 ... 0.71 mm as checking dimension.

If necessary, set stroke to 0.70 mm ABDC by pivoting the injection pump.

Remove setting mandrel KDEP 1123.

Mount electric lead on solenoid-operated valve.



Remove measuring tool KDEP 1085 with dial indicator.

Mount bleeder screw with new seal ring.

Secure injection lines on injection pump and nozzle holders.

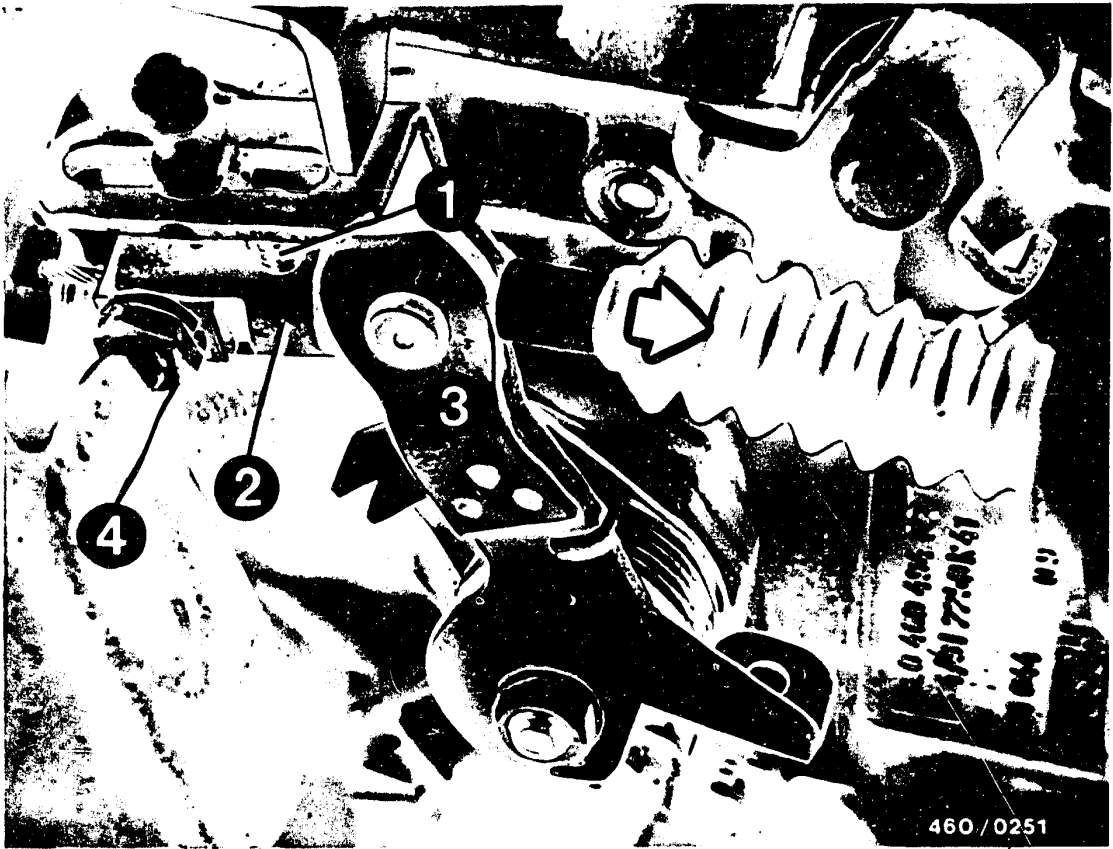
When tightening, prevent the delivery-valve holders from turning by holding with a wrench.

**G8**

Injection timing

Renault 18/20 D, 20/30 TD, Fuego TD





Pull control lever (3) with intermediate piece (2) in direction of hydraulic head.

Turn intermediate piece (2) through 90° and push again toward drive shaft.

Intermediate piece is in starting position.

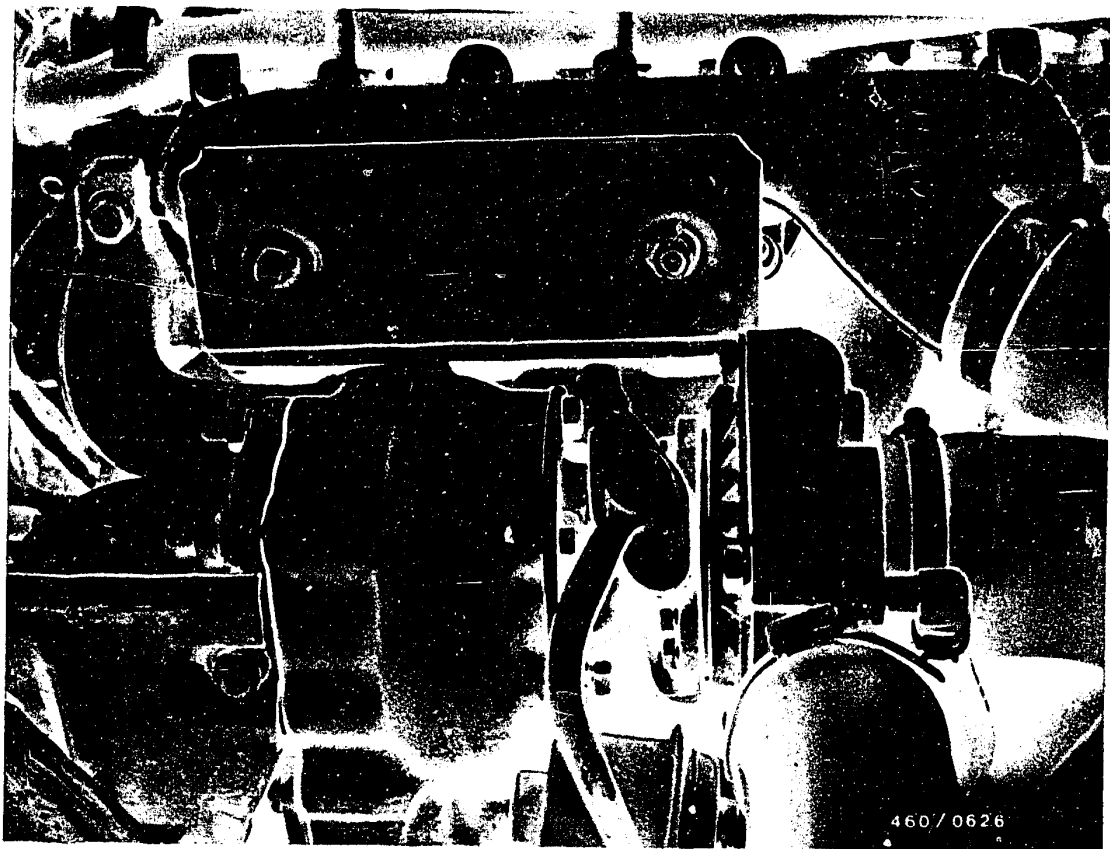
Tighten clamping screw (1).

**G9**

Injection timing

Renault 18/20 D, 20/30 TD, Fuego TD

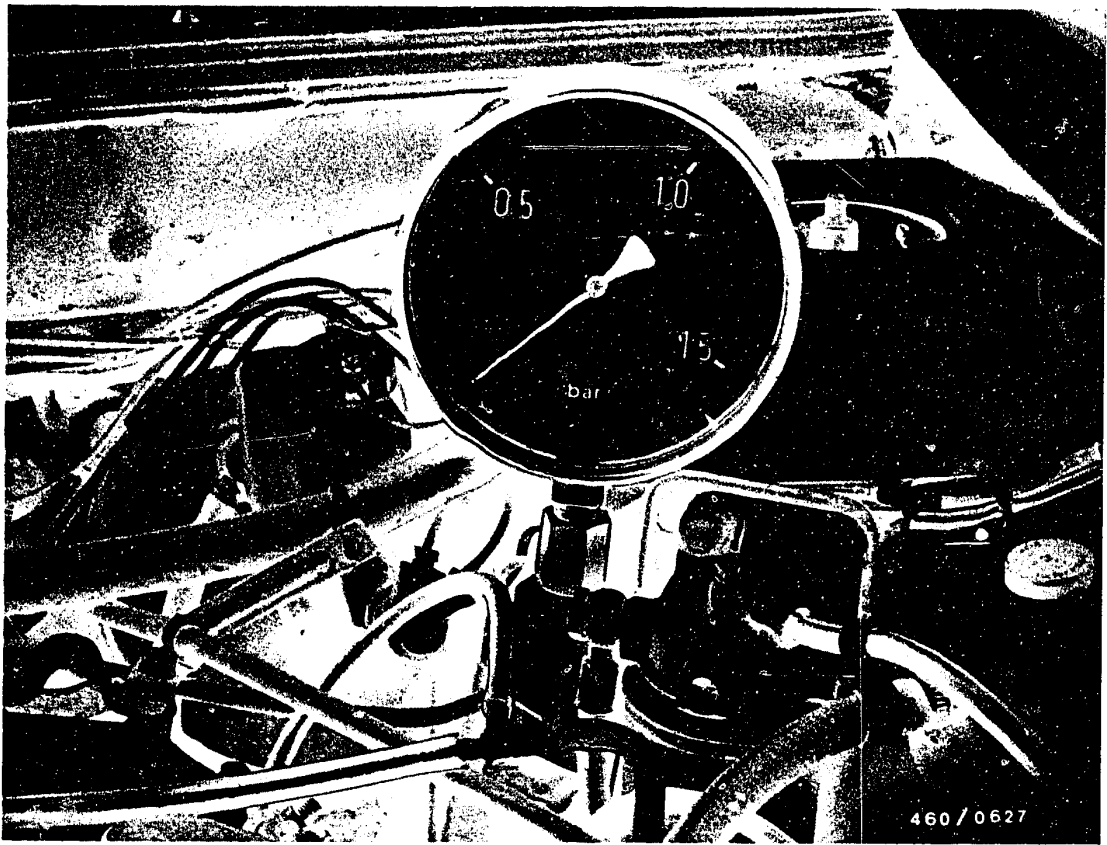




## 28. Test charge-air pressure

When working on the turbocharger, it should be noted that even the smallest particles of dirt can lead to the destruction of the turbocharger. Therefore, never operate the engine without air filter.





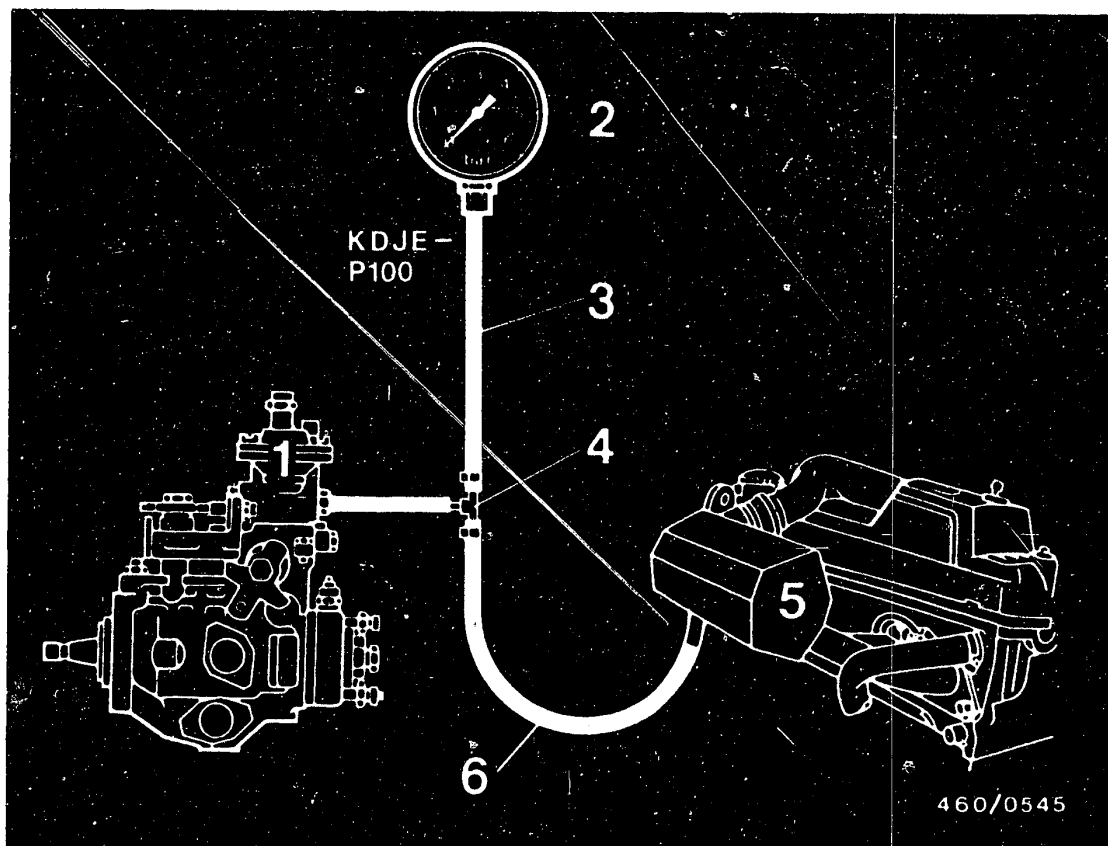
To test the charge-air pressure, it is possible to use the pressure tester KDJE-P 100 or a pressure gauge 0...1,6 bar (e. g. Wika No. 4184).

**G11**

Test charge-air pressure

Renault 18/20 D, 20/30 TD, Fuego TD





### 28.1 Mounting the pressure tester KDJE-P 100

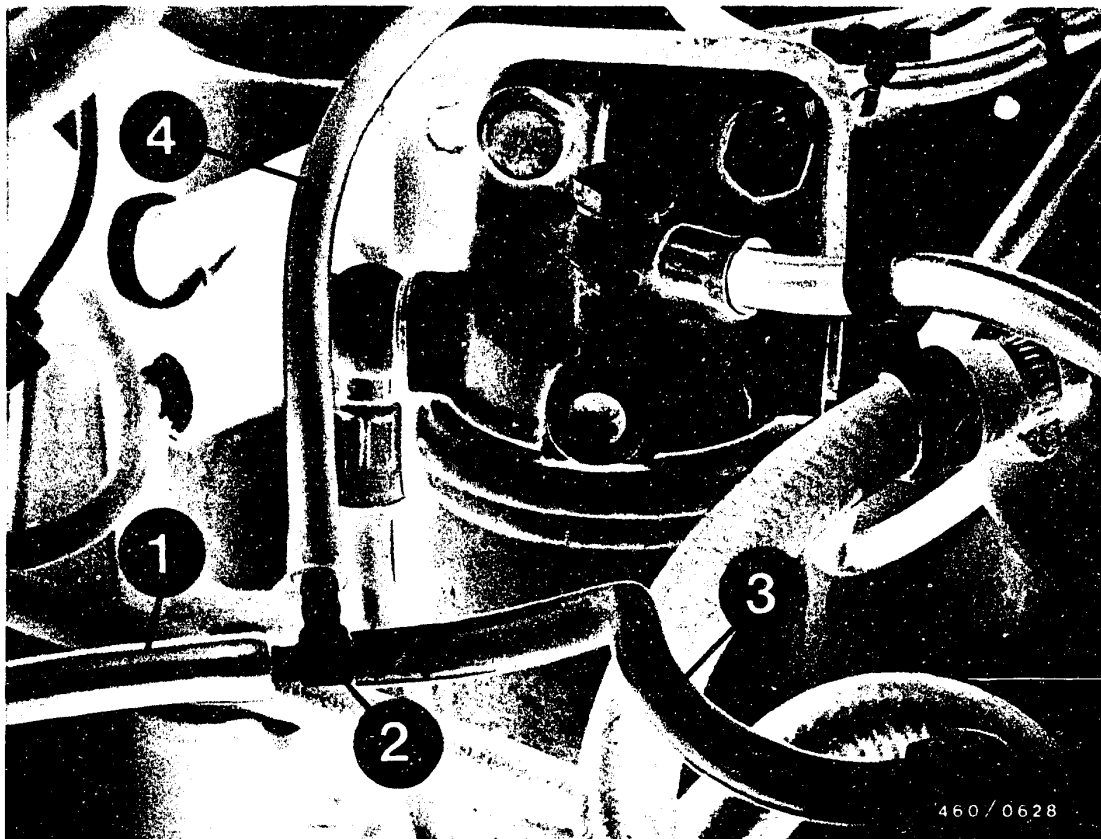
Remove connecting hose between charge-air tube (5) and the manifold-pressure compensator of the injection pump (1) at the charge-air tube.

Fit T-piece (4).

Make connection to charge-air tube using commercially available hose (6).

Connect connecting hose (3) of pressure tester (2) to T-piece.





### 28.1.1 Mounting the pressure gauge for measuring the charge-air pressure

Remove connecting hose (1) between charge-air tube and manifold-pressure compensator of injection pump at charge-air tube (arrow).

Fit Y-piece (2).

Make connection to charge-air tube using commercially available hose (3).

Fit connecting hose from pressure gauge onto Y-piece (4).





### 28.1.2 Measuring the charge-air pressure

The charge-air pressure is measured at full load, if possible on chassis dynamometer, at  $2250 \pm 250 \text{ min}^{-1}$  in the range from 80 ... 100 km/h in 5th gear.

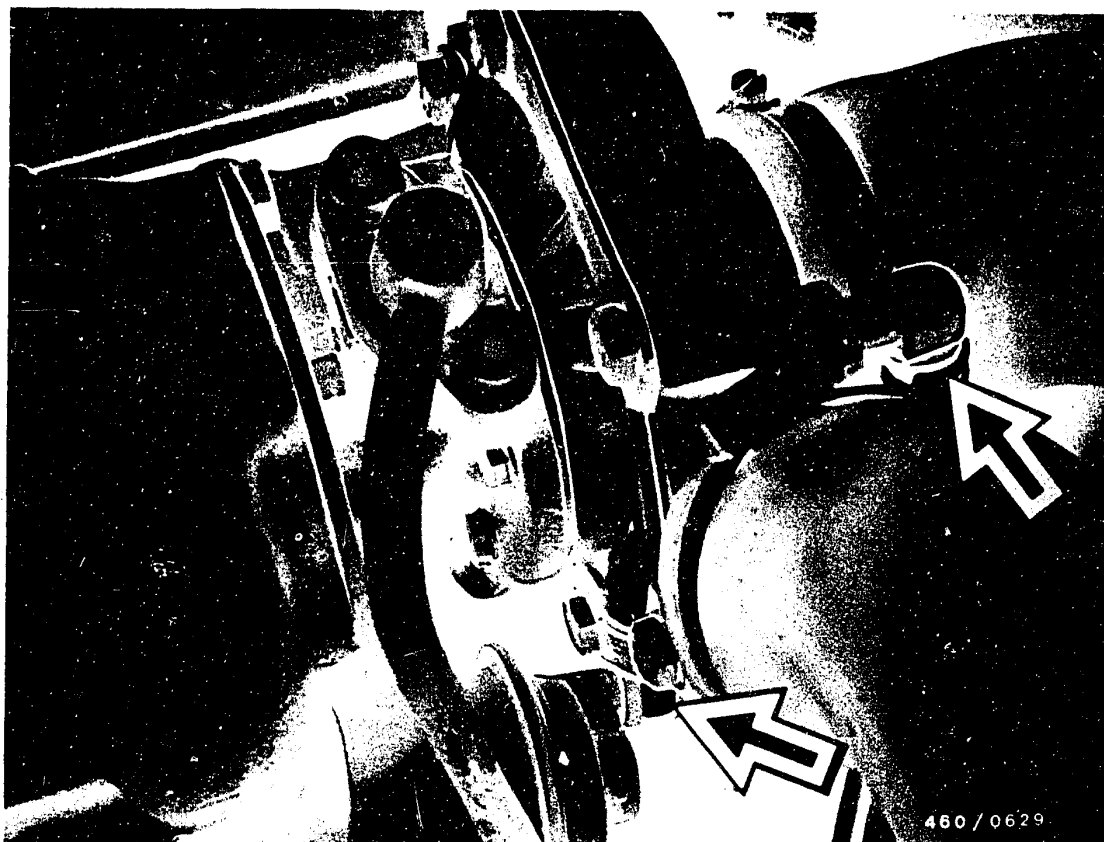
Read off charge-air pressure on pressure gauge.

Set value:  $0.6 \text{ bar} \pm 0.025$

#### Note:

To assess the exhaust-gas turbocharger, it is essential that the start of delivery and nozzle-opening pressure be correctly set, that the air-intake and exhaust systems do not have any leaks, and that the engine (valve clearance, compression pressure) is in good mechanical condition.





### 28.2 Charge-air pressure too high

Cause of charge-air pressure being too high :

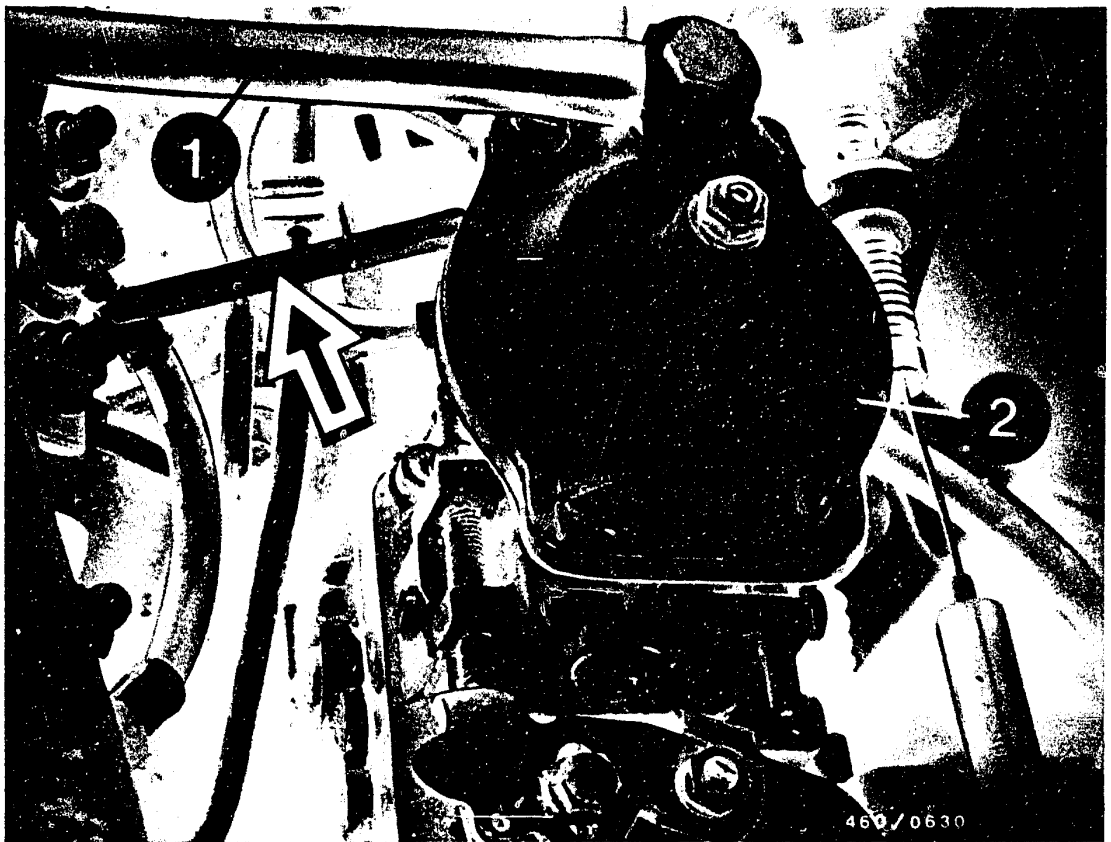
- Line to wastegate loose or defective (arrow)
- Wastegate diaphragm defective \*
- Wastegate valve seized, closed \*
- Wastegate valve incorrectly set \*

\* Replace turbocharger.

#### Note:

After installing a new turbocharger, fill turbocharger with oil and allow engine to idle for approx. 1 minute so that there is a guaranteed supply of oil to the turbocharger.



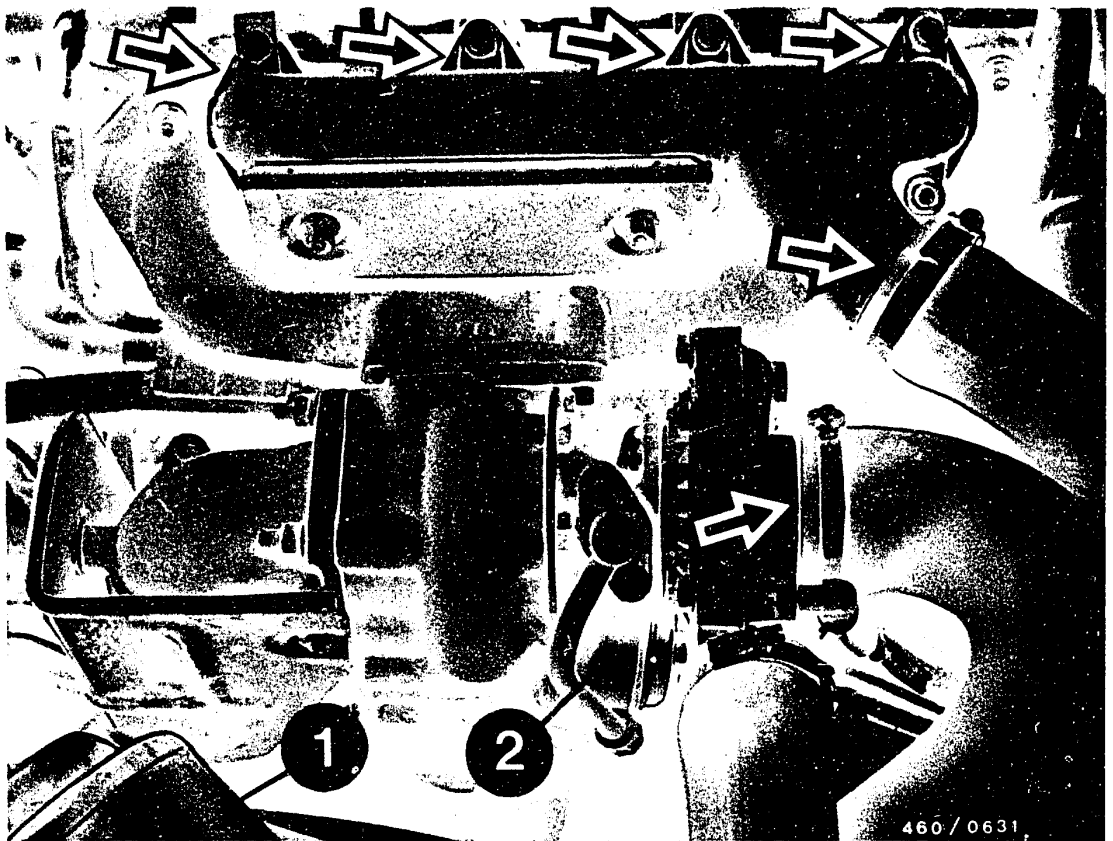


### 28.3 Charge-air pressure too low

If charge-air pressure too low, check the following points for leaks:

- Connecting hose (1) between charge-air tube and manifold-pressure compensator (injection pump).
- Air line on manifold-pressure compensator (arrow) possibly clogged.
- Diaphragm in manifold-pressure compensator (2).





- Seal between charge-air tube and engine block (see picture, upper arrows).
- Connecting hose between compressor outlet and charge-air tube (lower arrows).

Further causes of charge-air pressure being too low:

- Air filter (1).
- Wastegate incorrectly set (2). \*
- Turbine wheel shaft tending to seize. \*
- Exhaust system clogged.

\* Replace turbocharger.



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